Performance of Regulated Canadian Airlines in Domestic and Transborder Operations

William A. Jordan

Consumer and Corporate Affairs Canada

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The analysis and conclusions of this study do not necessarily reflect the views of the Department.

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ACRONYMS

Acronyms were used in this study to designate various airlines and other organizations. The following is a list of these acronyms together with the full names that they represent:

A. Airlines

AC	Air Canada
ACL	Air California
AFL	Air Florida
AL	Allegheny Airlines
CP	CP Air
DL	Delta Air Lines
FL	Frontier Airlines
NC	North Central Airlines
ND	Nordair
NW	Northwest Airlines
PSA	PSA, Inc. and Pacific Southwest Airlines
PV	Eastern Provincial Airways
PW	Pacific Western Airlines
QB	Quebecair
SO	Southern Airways
SWA	Southwest Airlines
TW	Trans World Airlines
TZ	Transair

B. Other Organizations

CAB	U.S. Civil Aeronautics Board
CCAC	Consumer and Corporate Affairs Canada
CTC	Canadian Transport Commission
CTC(A)	Air Transport Committee of the Canadian Transport Commission
DBS	Dominion Bureau of Statistics, now Statistics Canada
FAA	Federal Aviation Administration, U.S. Department of Transportation
PUC	California Public Utilities Commission
SC	Statistics Canada
SC(ASC)	Aviation Statistics Centre, Statistics Canada
TC	Transport Canada

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FOREWORD

This study examines factors affecting the efficiency of Canadian mainline and regional airlines. In so doing, it empirically explores arguments frequently introduced in support of existing regulation of Canadian air carriers. The conceptual framework adopted is one imposed by the bare fact that in Canada, major air carriers have always been regulated. In these circumstances, coming to grips with questions relating to the adequacy of performance and the scope for improvement led the author to compare performance characteristics of Canadian mainline and regional carriers with those of the lightly regulated U.S. intrastate carriers, as well as with regulated U.S. trunk and local service carriers.

The application of this approach to comparative airline costs in the two countries initially called for cost data relating to domestic, transborder and international routes. Although such U.S. information was readily available from the U.S. Civil Aeronautics Board and from the U.S. intrastate carriers, confidentiality considerations prevented access to parallel information for Canadian carriers. As a result, the analysis in portions of this study is conducted at a more aggregative level than otherwise would have been the case. This is why certain conclusions -- for example, those relating to the incidence and significance of cross-subsidization -- must be interpreted with caution, as Professor Jordan warns repeatedly.

Because of the nature of the study's framework, data are used for the four-year period, 1975 to 1978. Thus, the transitional developments following the passage of the U.S. Airline Deregulation Act in October 1978 are kept deliberately outside the scope of this study. The study's results, however, are directly relevant to the implications for Canada of the U.S. policy of deregulation. Since a major concern about the appropriateness of deregulation for Canada is that Canadian weather conditions and markets are very different from those in the United States, the study focuses specifically on these important questions and concludes that relatively severe weather and small population in Canada have no discernible effects on airline performance. Therefore, given the greater efficiency of U.S. intrastate carriers, the author predicts that, with substantial removal of regulation, operations of Canadian carriers could be expected to approach the more efficient performance of their U.S. intrastate counterparts, thus setting the stage for substantial fare reductions in Canada. In addition to such price reductions, greater reliance on market forces would provide the traveling public with widely available, no-frills, no-fence air service in Canada.

The study attempts a frontal attack on some fundamental questions of Canadian airline operations and removes a number of important elements of uncertainty. Analysis of the possible different effects of weather on airline costs in the two countries, for instance, is the most exhaustive to date. And it lays to rest the notion that the ostensibly more severe Canadian climate could account for significant cost differences. Similarly, the study's analysis of relative fuel costs, during the period under review, clearly indicates that although this factor contributed to the higher costs

of Canadian carriers, the difference is offset by more efficient utilization of fuel by Canadian carriers.

Analysis of other items affecting costs and measured efficiency (e.g., the wage bill and labour productivity, profits, etc.) suggests that the explanation for differences in airline performance in the two countries cannot be attributed to the factors examined. Further comparison -- this time between federally-regulated unit toll operations in the two countries -- reveals important similarities between the two sets. In conclusion, the author attributes differences in performance to that feature common to both Canadian carriers and their U.S. interstate counterparts which is absent from the operating environment of intrastate carriers, namely, federal regulation.

While the study substantially advances the understanding of factors affecting the performance of Canadian air carriers, it does not deal in depth with all the relevant questions or remove all uncertainty from those areas it does address. Such expectations would be naive. It does provide, however, an indepth empirical analysis in a conceptual framework that carries with it the advantage of avoiding controversy over the transitional phase of the current deregulation experiment in the United States. Its publication makes a useful contribution to growing public interest in the merits of competition vis-à-vis regulation in Canadian air travel markets. As a Research Monograph it takes its place alongside several other recent studies of this Branch, examining the scope for increased reliance in Canada on market forces in various modes of transportation.

D. McKinley
Director
Research and International
Relations Branch

SUMMARY

Fundamental similarities existed in the economic performances of the Canadian airlines and the U.S. interstate airlines during the years through 1978, when both groups of carriers operated under generally comparable federal regulation. Not only were there no appreciable differences associated with nationality, but ownership (private versus government) was also not a relevant factor. In contrast, during these years the performances of the major U.S. intrastate carriers, operating under state regulation in California, Florida and Texas, differed substantially from those of the federally-regulated airlines. The evidence analyzed in this study indicates that the large differences in performance between the federally-regulated airlines in Canada and the United States, on the one hand, and the U.S. intrastate carriers, on the other hand, were due to the differences in their regulatory environments.

The differences in regulatory environments stemmed from the fact that the U.S. interstate carriers (regulated by the Civil Aeronautics Board) also provided extensive services within California, Florida and Texas in competition with the state-regulated airlines. Thus, in contrast to the federal regulatory monopolies in Canada and the rest of the United States, a duopolistic regulatory environment evolved in these states which allowed extensive price and service competition to develop following the entry of the new intrastate carriers. Specifically, the successful intrastate carriers offered much lower fares and incurred correspondingly lower operating costs, while achieving profits comparable to those of the federally-regulated airlines.

This study predicts that if the performance of the U.S. intrastate carriers is judged to be desirable for Canada, it can be achieved by reducing federal regulation to permit the duplication of the attributes that characterized the intrastate airline environment -- that is, entry into the industry by all new airlines complying with federal safety requirements (with both new and existing airlines permitted to operate over the routes of their choice without restriction as to type of aircraft utilized); extensive price competition; and no restrictions on service quality and quantity.

The following is a more detailed summary of the major performance differences found to exist between the federally-regulated airlines and the U.S. intrastate carriers.[1]

1. Domestic and transborder economy fares per mile of the Canadian mainline and U.S. trunk carriers were virtually identical (pp. 6 and 15). As of the end of 1978, these fares per mile were 50 to 100 per cent higher than the economy fares per mile of the U.S. intrastate carriers, and 100 to 180 per cent higher than the intrastate carriers' off-peak fares per mile for evening and weekend service (pp. 8-10). Fares per mile of the Canadian regional and U.S. local service carriers were generally higher than those of the mainline and trunk carriers (pp. 10-14).

2. Consistent with the fare differences, during 1975-78 the federally-regulated airlines' total operating expenses per revenue ton-mile (RTM) averaged between 47 and 112 per cent higher than the three largest intrastate carriers (Air California, PSA and Southwest), after adjusting for the effects of distance (pp. 27 and 165).

3. Operating ratios (operating expenses divided by operating revenues) for the Canadian mainline and regional carriers ranged from 90.6 to 97.8 per cent during 1978, compared with 88.4 to 98.0 per cent for the U.S. trunk and local service carriers, and 73.9 to 98.1 per cent for the U.S. intrastate carriers (p. 22). Thus, the low-fare U.S. intrastate carriers did as well or better than the federally-regulated airlines in terms of operating profits.

4. Studies of weather (pp. 131-44), population (pp. 145-62) and economies of scale (p. 181) found that the differences in total operating expenses per RTM could <u>not</u> be attributed to these factors.

5. Payments for labour and petroleum products comprised around 60 per cent of total system operating expenses in 1978, with labour accounting for around 39 per cent and petroleum products for about 21 per cent (pp. 99-101). Thus, much of the differences in total operating expenses per RTM was necessarily due to differences in the prices and/or utilization of these two major inputs.

6. During 1978, total employee payments per RTM for the federally-regulated airlines ranged from -25.8 per cent below to 18.3 per cent above a distance-related trend line fitted to the data for these carriers (p. 92). In contrast, the U.S. intrastate carriers fell much farther below the trend line, ranging from -38.9 to -65.1 per cent below the line. Their superior performance was due in part to paying lower wages that averaged about $22,000 (excluding Air Florida) in 1978 (compared with around $30,000 for the U.S. trunk, $27,500 for the U.S. local service, $25,000 for the Canadian mainline and roughly the same $22,000 for the Canadian regional carriers -- see p. 82). More importantly, however, their good performance was due to producing from 67 to 118 per cent more RTM per employee than the distance-adjusted norm for the federally-regulated airlines (p. 67).

7. The U.S. intrastate carriers also achieved the lowest fuel expenses among the carriers studied. The three largest intrastate carriers ranged from -11.5 to -20.0 per cent below the federally-regulated airlines' distance-related trend line for fuel expenses per RTM during 1975-78 (p. 121 and footnote 8, Chapter IX). Relative to the U.S. carriers, this was due entirely to higher fuel utilization since the intrastate carriers' system fuel prices averaged one to two per cent above those of the trunk and local service carriers.

8. Canadian mainline carriers generally paid from 15 to 20 per cent more per litre for fuel systemwide than comparable U.S. trunk carriers in

1975-78, and the Canadian regional carriers paid from 16 to 43 per cent higher prices than the U.S. local service carriers (p. 106). A major source of these intercountry differences was the higher federal and provincial sales taxes and the higher fuel-related airport fees in Canada compared with the United States. Deleting these taxes and fees from the domestic fuel prices of both countries resulted in net prices paid by Air Canada and CP Air seldom being more than 5 per cent higher than comparable U.S. trunk carriers, while the net prices of the Canadian regional carriers were reduced to being generally between two and 24 per cent above those of the U.S. local service carriers (p. 108). Thus, one way for Canadian airline costs to be reduced would be for domestic fuel taxes and airport fees to be lowered to U.S. levels.

9. Canadian carriers generally counterbalanced their higher fuel prices by producing above average RTM per litre. Except for Eastern Provincial and Transair, during 1975-78 they produced from 5.5 to 19.6 per cent more RTM per litre than the norm for the federally-regulated airlines (similar to the 4.8 to 31.9 per cent above-average productivity achieved by the three largest U.S. intrastate carriers in their relatively competitive environment -- see p. 112).

10. Fragmentary evidence from traffic and revenue shares and from differences in cost-adjusted yields indicates that the Canadian mainline carriers may be cross-subsidizing their international operations at the expense of domestic operations (pp. 45-46 and 47-48). The refusal of the airlines and the Canadian Transport Commission to allow cost information by operating area to be presented in this study makes it impossible to provide better evidence on this matter.

One reason for the similarities between the performances of the Canadian and U.S. federally-regulated airlines could be the fact that the majority of traffic on Canadian carriers was transported to and from points outside Canada. During 1975-78, Air Canada carried just 50.0 per cent of its total system RTM domestically, and CP Air, Nordair and Quebecair all carried less than 40 per cent of their system RTM solely within Canada (p. 34). Only Eastern Provincial, Pacific Western and Transair produced more than half of their traffic domestically. Combined, purely domestic RTM accounted for just 47 per cent of total system RTM for the seven Canadian carriers during these years, with 15 per cent being carried on transborder services and 38 per cent internationally (p. 36). In comparison, the U.S. carriers produced at least 64 per cent domestically, and generally produced over 95 per cent of system RTM within the United States. One implication of this is that any changes in purely domestic regulatory policies would apply to a much smaller share of the total system operations of Canadian carriers than U.S. carriers.

The basic performance similarities of federally-regulated Canadian and U.S. airlines imply that the U.S. experience under deregulation would be generally duplicated in Canada if similar policy changes were implemented in this country. Overall, based on the U.S. intrastate carriers' performance

through 1978, it is predicted that Canadian airline performance would change in the following ways under deregulation:

1) Prices would decrease by as much as 50 per cent from regulated levels.
2) The fare structure would become much less complicated.
3) Operating costs of successful airlines would be substantially reduced.
4) Profits of successful airlines would be comparable to the historical levels of present-day carriers.
5) The number of airlines would increase, with each being more specialized than existing regulated airlines.
6) Service quality would decline somewhat, with the elimination of first-class service, increases in seat densities and increases in average load factors.
7) Charter service would decline substantially and would be largely limited to single-entity services.
8) There would be no change in safety, with existing safety regulation continuing under Transport Canada.

Postponing the implementation of deregulation in Canada would not be risk free. The direct competition by low-cost U.S. carriers over the important transborder routes, indirect competition for international traffic through nearby U.S. cities and the pressure on the high-cost Canadian carriers to introduce low fares domestically could result in weakened mainline and regional carriers eventually having to undergo the necessary adjustments of deregulation more rapidly and painfully than their experienced U.S. counterparts.

The low-fare and low-cost performance of the U.S. intrastate carriers has demonstrated that deregulation is a viable policy alternative. Deregulation has not brought chaos to the U.S. industry. To date, U.S. airlines have been slowly adjusting to deregulation while coping with other major changes that have been quite unrelated to deregulation (such as uniquely large increases in fuel prices). New airlines have begun to enter the industry and existing airlines have expanded into new routes, resulting in substantial increases in competition in many city pairs.

Deregulation does have one fundamental advantage over continued regulation. The long-term economic strength of low-cost carriers is much greater than that of high-cost carriers, and low-cost operations have been the norm under deregulation. Therefore, deregulation policies designed to foster low-cost operations will more likely be successful than alternative policies. Furthermore, low-cost carriers are able to offer low fares, thereby allowing the inherent technological advantages of air transportation to effectively shrink the distances between the dispersed regions of a large country such as Canada.

Footnote

1. The following 18 airlines were included in this study: Canadian mainline -- Air Canada and CP Air; U.S. trunk -- Delta, Northwest and Trans World; Canadian regional -- Eastern Provincial, Nordair, Pacific Western, Quebecair and Transair; U.S. local service -- Allegheny, Frontier, North Central and Southern; all compared with each other and with the major U.S. intrastate carriers -- Air Florida, Air California, PSA and Southwest (see footnote 3, Introduction).

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INTRODUCTION

This study has two major objectives. One is to determine in what ways airline performance is affected by the regulation of the Air Transport Committee of the Canadian Transport Commission [CTC(A)]. The second objective is to isolate factors that affect airline costs -- that is, to find out why some airlines have higher operating costs than others. It happens that these two objectives are not mutually exclusive since, as will be shown in the following chapters, important differences in airline costs have been associated with differences in regulation. Possible sources of cost differences are outlined in Chapter III, and the reader is referred to that chapter for a discussion of the many factors which can influence airline costs. In the meantime, this introduction will describe the differences in regulation that have existed in various North American jurisdictions and which underly the research methodology used in this study -- both to measure the effects of regulation and to gain insights into the reasons for differences in airline costs.

A useful way to measure the effects of regulation is to compare the performances of airlines that operate in different regulatory environments. It is impossible to do this within Canada because the CTC(A) regulates all commercial air activities from the largest airline to the smallest flying club.[1] Thus, it is necessary to look outside Canada to find airlines that operate under significantly different regulation. Fortunately, the United States provides a range of regulatory environments within which airlines have operated. On the one hand, airlines providing interstate common carriage services with large aircraft operate under the jurisdiction of the Civil Aeronautics Board (CAB) which, until the Airline Deregulation Act (ADA) was adopted on October 24, 1978, had powers over airline entry, exit and prices that were very similar to those of the CTC(A).[2] On the other hand, interstate airlines operating small aircraft (having less than 20 or 30 seats) have been exempted from CAB regulation, and intrastate airlines operating large aircraft within a single state did not fall under the CAB's jurisdiction until the ADA's enactment but, rather, were regulated to varying degrees by state commissions.

<u>Intra</u>state operations are of special interest to this study because state regulation made it possible for new airlines to enter the industry in California, Florida and Texas where they found state commissions sympathetic to their requests for lower fares in order to compete more effectively with the established airlines. As a result, the intense rivalry that developed within the <u>regulatory duopolies</u> comprised of state-regulated carriers, on the one hand, and CAB-regulated airlines, on the other, could be expressed through a full range of innovations encompassing both lower fares and differentiations in service quality. Furthermore, intrastate carriers failing to perform effectively could be forced out of business via bankruptcy or other means. In contrast, the <u>regulatory monopolies</u> existing in Canada and in the remainder of the United States essentially prohibited the entry of new airlines operating large aircraft and rarely allowed general fares to

deviate from commission-approved fare formulas. Therefore, the rivalry among the existing carriers was limited primarily to innovations in service quality. In addition, bankruptcies never occurred -- rather, exit took place solely through mergers with other regulated airlines [Jordan (a) and (c)].

Time constraints limit this study to a comparison of the performances of Canadian airlines operating large turbine-powered aircraft in scheduled service (the two mainline and five regional carriers) with three selected U.S. interstate trunk and four selected local service carriers, and with the four major intrastate carriers providing scheduled service in California, Florida and Texas -- all of which also operated large turbine-powered aircraft.[3] If regulation by a single commission has an appreciable impact on airline performance, there should be major similarities in the performances of the Canadian mainline and regional carriers, on the one hand, and the performances of the CAB-regulated trunk and local service carriers, on the other hand. At the same time, there should be significant differences between the performances of these two carrier groups and the intrastate carriers operating in a regulatory duopoly.

This study emphasizes the four-year period from 1975 through 1978. Four years were analyzed in order to avoid possible anomalies occurring in a single year. The study ends with 1978 because the major changes in U.S. airline regulation resulting from the passage of the Airline Deregulation Act make it inappropriate to use data after this point. First of all, the ADA preempted state regulation and made the former intrastate carriers subject to CAB regulation, thereby eliminating the regulatory duopolies in California, Florida and Texas.[4] Second, the ADA changed federal policies and CAB procedures to facilitate the entry of new carriers into the industry and to increase the ease with which certificated carriers could enter new or leave existing routes or city pairs. One result has been the expansion of the former intrastate carriers beyond the boundaries of their individual states. Third, carriers were allowed fare flexibility within a range extending from 50 per cent below to five per cent above a standard industry fare level specified by the CAB. Fourth, the CAB's powers over entry/exit, routes, fares and antitrust matters were scheduled to be phased out starting on December 31, 1981, with the Board itself being abolished on January 1, 1985 (Dubuc, 1979, pp. 21-34). Obviously, with the elimination of the regulatory duopoly and the reduction in CAB powers relative to those of the CTC(A), the U.S. regulatory environment following 1978 was no longer consistent with the methodology used in this study.

Assuming the phased provisions of the ADA are fully implemented, the transition period in U.S. airline regulation which began in 1979 will, over time, provide evidence on the many adjustments required to move from regulation to deregulation. When evaluating the transitional effects of U.S. deregulation, however, it will be necessary to consider the effects of other occurrences not related to airline deregulation. For example, in February 1979, four months following the passage of the ADA, turbine fuel prices were decontrolled and, two years later, crude oil prices were also decontrolled

[PSA (a), 1979, p. 7 and (f), 1980, p. 3]. The resulting large increases in turbine fuel prices resulted in increased operating costs and fares for U.S. airlines that were not related to the deregulation of the industry and which have yet to be experienced by Canadian carriers as of mid-1981.

The U.S. experience will also eventually provide direct evidence regarding industry structure and performance under deregulation. That evidence will not be forthcoming for a number of years, however, since, unlike changes in laws and regulations, adjustments in the marketplace do not occur with the stroke of a pen. It will take a great deal of experimentation over a period of years for existing airlines to determine their optimal route structures, fares and service qualities. Even more time will be required for new airlines to be organized, begin operations and discover their optimal route, fare and service patterns. Given that the CAB will not disappear until 1985, the use of current U.S. airline performance to evaluate the long-term effects of deregulation should be postponed at least until then, and full adjustments to deregulation will probably not occur until several years thereafter. In the meantime, the performance through 1978 of the intrastate carriers in their long-established regulatory duopolies, compared with the performance of the federally-regulated airlines, provides the best available evidence regarding the eventual results of deregulation. This is the evidence analyzed in this study.

Footnotes

1. Transport Act, S.C. 1938, c. 53, parts I-II; and Aeronautics Act, S.C. 1944-45, c. 28; now, as amended, R.S.C. 1970, c. A-3. Also, Transport Canada (b), pp. 85-95 and 100-04.

2. Airline Deregulation Act of 1978, Public Law No. 95-504, 92 Stat. 1705. For a detailed comparison of the powers and procedures of the CTC(A) and the CAB from 1938 to 1978, see Jordan (c), pp. 17-31. The CTC(A)'s power over service quality (such as schedules) was greater than that of the CAB, and there were differences in the procedures used by the two commissions, with those of the CAB being more formal, lengthy and open.

3. The three trunk and four local service carriers were selected for the following reasons from the 11 trunk and eight local service carriers in existence during 1975-78. Trans World and Northwest are the U.S. carriers most like Air Canada and CP Air in terms of systemwide geographic operating areas. Air Canada and Trans World both have major transcontinental route systems with additional routes extending down to the south and southwest United States. In addition, their international routes are predominantly transatlantic. CP Air and Northwest also have roughly parallel transcontinental routes extending on to Hawaii, with major transpacific international routes. Northwest also serves the U.S. south and southwest while CP Air operates to California, Mexico and South America. All four of these carriers have substantial operations in areas that experience adverse weather conditions during the winter. In contrast, Delta was selected because its major transcontinental route extends along the southern boundary of the United States so that it should be less affected by adverse weather condi-

tions, thereby providing a way to investigate the effects of weather on airline costs.

Similar criteria were used in selecting the U.S. local service carriers. Allegheny, North Central and Frontier have had the majority of their routes in northern climes (including Canada), while Southern operated primarily in the south and, in common with Delta, was based in Atlanta. (The merger of North Central and Southern effective July 1, 1979, occurred after the period under study.) [See ATPC (a).]

4. The California Public Utilities Commission (PUC) contested the termination of its authority over airlines, and several airlines sued to enjoin the PUC from attempting to regulate airline operations in California. On March 9, 1979, the U.S. District Court, Northern District of California, ruled in favour of the airlines and enjoined the PUC from enforcing state regulatory laws over the airlines [Hughes Air Corp., dba Hugh Airwest, et al. v. The Public Utilities Commission of the State of California, Civil Action No. C-78-2880-SW (March 9, 1979)].

Chapter I

FARE LEVELS

In an earlier study, the fare histories of the Canadian mainline, U.S. trunk and California/Texas intrastate carriers were compared from 1946 to mid-1977 [Jordan (a), pp. 41-54]. The main conclusions of that comparison were that the

> regulated, lowest, widely available fares of Air Canada and CP Air were very similar to the CAB-regulated fares in the United States in both level and structure during the 1960s and early 1970's.... In contrast, really major differences have consistently existed between the federally regulated fare levels in both countries, on the one hand, and those of the intrastate carriers within California and Texas, on the other hand. Sustained fare differences in excess of 90 percent (and as high as 246 percent) are just too large to be dismissed as exceptional aberrations. (Ibid., p. 53)

The sustained fare differences specified in this quotation were the percentages by which the fare levels of the federally-regulated airlines <u>exceeded</u> those of the intrastate carriers. The fare histories of these carriers are extended on through to the end of 1978 in Appendix A. In addition, this chapter also presents fare information for the Canadian regional and U.S. local service carriers. These more recent and expanded fare data will be analyzed in this chapter, and it will be seen that they support the main conclusion of the earlier study.

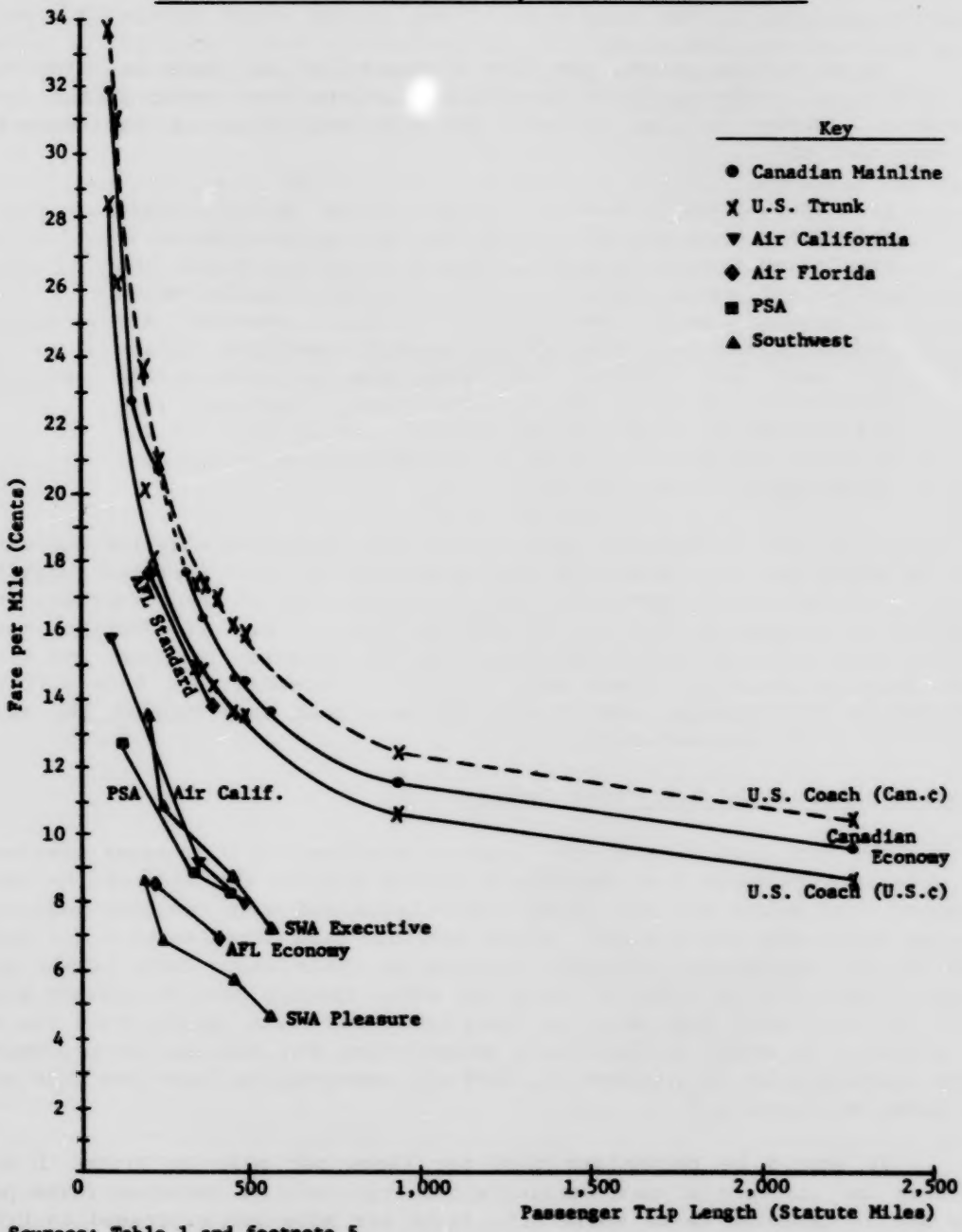
Canadian Mainline and U.S. Trunk Carriers

The fare histories of the Canadian mainline and U.S. trunk carriers are presented in Table 1 of Appendix A (Table A.1) in the form of the fare formulas from which all U.S. trunk coach fares and most Canadian mainline economy fares were calculated.[1] Since explicit fare formulas have not been used by the intrastate airlines, changes in their coach fare levels are given in Table A.2 in terms of fares per mile, ranging from relatively high rates for short-haul city pairs to lower rates for their longer hauls (up to 563 miles). In order to facilitate comparisons, the various economy/coach fares authorized as of December 31, 1978 are converted to fares per mile and are drawn on Figure 1.[2]

It should be recognized that the fares per mile in Figure 1 are given in the currency of each carrier's country; that is, Canadian fares per mile are in Canadian cents while U.S. fares per mile are expressed in U.S. cents. It might be argued that all U.S. fares per mile should be converted into Canadian cents before making direct comparisons, but it is not clear

Figure 1

Fares per Mile
Canadian Mainline, U.S. Trunk and U.S. Intrastate Carriers
December 31, 1978



Sources: Table 1 and footnote 5

that doing so would result in more accurate comparisons of relative domestic fares as perceived by the residents of each of the two countries. Certainly, the 18.4 per cent reduction in the value of the Canadian dollar relative to the U.S. dollar between 1974 and 1978 resulted in Canadians having to pay more (in Canadian dollars) to fly on U.S. airlines within the United States.[3] U.S. domestic air transportation is no different in this respect than any other U.S. product or service purchased by Canadian residents in Canadian dollars. It does not follow from this, however, that exchange rate fluctuations have the same effect on prices paid by Canadian residents for domestic Canadian goods. Also, it seems highly unlikely that Canadians perceive their domestic airline prices as having gone down whenever the Canadian dollar depreciates relative to the U.S. dollar. Nor do U.S. residents feel their domestic airline fares have increased because of this exchange rate fluctuation. The truth probably lies somewhere between the two extremes of making no adjustment for exchange rates, on the one hand, and making the full adjustment, on the other hand (see Appendix B).

To give some perspective regarding the possible effects of exchange rates, the U.S. trunk carriers' fares per mile as of December 31, 1978 were converted into Canadian cents using the average exchange rate in effect during December 1978 (see footnote 3). These adjusted fares per mile appear on Figure 1 as the broken line lying above the Canadian fares per mile. It can be seen from this that the Canadian fares per mile lie between the U.S. fares per mile expressed in U.S. cents (the lower U.S. line) and in Canadian cents (the higher U.S. line). Given that some intermediate position depicts the true effects of exchange rate differences, it is clear that the fares per mile of the regulated Canadian mainline carriers are remarkably close to the fares per mile of the regulated U.S. trunk carriers, both in terms of fare level (the heights of the lines) and fare structure (the large distance taper resulting in decreases in fares per mile as distance increases). This, of course, is consistent with the first conclusion of the earlier study, as quoted at the beginning of this chapter.

The second conclusion was that the fare levels of the federally-regulated airlines were much higher than those of the intrastate carriers operating in a regulatory duopoly. Figure 1 shows that this continued to be the case as of December 31, 1978. The fares per mile of the California/Florida/Texas intrastate carriers appear in the lower lefthand corner of Figure 1. With the exception of Air Florida's standard coach fares (which were roughly equal to the U.S. coach fares),[4] all these fares per mile were appreciably lower than the CAB-regulated fares per mile which, in turn, approximated the regulated fares per mile of the Canadian mainline carriers.

The differences between the federally-regulated U.S. and Canadian fares per mile, on the one hand, and the intrastate fares, on the other, are summarized in Table 1.[5] The next to last column on the right side of this table shows that the U.S. trunk carriers' fares per mile were generally 43.5 to 106.7 per cent higher than the fares per mile available on the regular weekday flights of the intrastate carriers. In terms of the night and weekend flights for Southwest and the capacity-controlled flights for Air

Table 1

Extent to Which the Fares per Mile of Federally-Regulated Airlines
Exceeded Those of Intrastate Carriers
Selected City Pairs, December 31, 1978[a]

State & City Pairs[b]		Mileages[c]		Fares per Mile[d]			Federally Reg. % Greater than Intrastate	
					Federally Reg.			
U.S.	Canada	U.S.	Can.	Intrastate	U.S.	Canada	U.S.	Canada
California								
SMF-SJC	YUL-YOW	94	94	15.76¢	28.56¢	31.91¢[e]	81.2%	103.5%
LAX-SAN	YUL-YOW	109	94	12.74	26.33	31.91[e]	106.7	150.5
LAX-SFO	YUL-YYZ	337	315	8.79	14.84	17.78[f]	68.8	102.3
SNA-SFO	YQM-YQB	368	369	9.06	14.83	16.26	63.7	79.5
SAN-SFO	YYZ-YQB	447	454	8.29	13.67	14.76	64.9	78.0
SAN-SMF	YUL-YZV	480	478	7.91	13.50	14.44	70.7	82.6
Florida								
MIA-TPA	YYZ-YOW	204	226					
Standard				17.70	18.61	20.80	5.1	17.5
Economy[g]				8.62	18.61	20.80	115.9	141.3
MIA-TLH	YYZ-YQB	402	454					
Standard				13.79	14.25	14.76	3.3	7.0
Economy				6.89	14.25	14.76	106.8	114.2
Texas								
HOU-SAT	YUL-YQB	192	145					
Executive[h]				13.51	19.39[j]	22.76	43.5	68.5
Pleasure[i]				8.68	19.39[j]	22.76	123.4	162.5
DAL-HOU	YYZ-YOW	241	226					
Executive[h]				10.76	17.77[k]	20.80	65.1	93.3
Pleasure[i]				6.92	17.77[k]	20.80	156.8	200.6
DAL-HRL	YYZ-YQB	458	454					
Executive[h]				8.69	13.45[l]	14.76	54.8	69.9
Pleasure[i]				5.66	13.45[l]	14.76	137.6	160.8
DAL-ELP	YYZ-YQT	563	565					
Executive[h]				7.07	12.89[m]	13.45	82.3	90.2
Pleasure[i]				4.61	12.89[m]	13.45	179.6	191.8

Sources: Same as for Tables A.1 and A.2

[a]January 8, 1979 for U.S. trunk fares. On October 27, 1978, the CAB authorized a 3.2 per cent fare increase. Most carriers implemented a 2.5 per cent increase on November 10, 1978 and the remaining 0.7 per cent increase on January 8, 1979.

[b]The following is a list of the city codes used in this table:

Canadian:	YOW	Ottawa	YQM	Moncton	YUL	Montreal
	YQB	Quebec City	YQT	Thunder Bay	YYZ	Toronto
					YZV	Sept-Iles
U.S.:	BRO	Brownsville	HOU	Houston-Hobby	SAT	San Antonio
	DAL	Dallas-Love Field	IAH	Houston-Int'l.	SFO	San Francisco
	DFW	Dallas/Ft. Worth	LAX	Los Angeles	SJC	San Jose
	ELP	El Paso	MIA	Miami	SMF	Sacramento
	HRL	Harlingen	SAN	San Diego	TLH	Tallahassee
					TPA	Tampa

[c]Statute miles, nonstop airport-to-airport distances where available

[d]In Canadian and U.S. cents, for the respective countries

[e]Lower than the formula fare level

[f]Higher than the formula fare level

[g]Capacity controlled. Prior to December 14, 1978, this fare category applied to all night and weekend flights.

[h]In effect on all flights scheduled to depart during weekdays from 6:30 a.m. to 6:59 p.m.

[i]In effect on all flights scheduled to depart during weekdays from 7:00 p.m. to 6:29 a.m. and any time on Saturdays and Sundays

[j]IAH-SAT (191 miles) for U.S. trunk carriers

[k]DFW-IAH (224 miles) for U.S. trunk carriers

[l]DFW-BRO (482 miles) for U.S. trunk carriers. BRO and HRL are common fared by the CAB-regulated airlines. Based on the DFW-HRL distance of 461 miles, this fare per mile would be 14.06 cents.

[m]DFW-ELP (553 miles) for U.S. trunk carriers

Florida,[6] the differences ranged from 106.8 to 179.6 per cent. In other words, the U.S. trunk carriers' coach fares were consistently more than twice as high as the off-peak fares of these two intrastate carriers, and were generally around two-thirds higher than comparable peak intrastate fares.[7]

Similar percentages are given for the Canadian mainline carriers in the far righthand column of Table 1. They show that Canadian economy fares per mile ranged from 68.5 to 150.5 per cent above the regular weekday fares per mile of Air California, PSA and Southwest, and 114.2 to 200.6 per cent higher than the off-peak fares of Air Florida and Southwest. Of course, these percentages are increased somewhat by comparing intrastate fares per mile in U.S. cents with Canadian fares per mile expressed in Canadian cents. Given the earlier conclusion that U.S. trunk and Canadian mainline fares per mile are very similar after allowing for the true effects of exchange rates, it seems proper to conclude that the Canadian mainline fares per mile are about 50 to 100 per cent higher than the intrastate carriers' regular coach fares per mile and from 100 to 180 per cent higher than their off-peak fares which were available on all night and weekend flights operated by Air Florida (until December 14, 1978) and by Southwest. The order of magnitude of the fare differences is so large that any reasonable exchange rate adjustment has no appreciable effect on the basic conclusion that Canadian mainline fares per mile are substantially higher than those of the U.S. intrastate carriers.

Canadian Regional and U.S. Local Service Carriers

In 1974, Phase 9 of the CAB's Domestic Passenger-Fare Investigation allowed local service carriers to file coach fares up to 30 per cent higher than the trunk coach fares calculated from the currently approved fare formula, and this policy was reaffirmed in 1978.[8] The result has been that fares for many city pairs served only by local service carriers have been as much as 30 per cent higher than they would have been had trunk service been available.[9] Thus, the percentage differences between CAB-regulated fares per mile and those available from intrastate carriers can be even greater than indicated in Table 1.

An example of these greater differences is the 270-mile, Dallas-Beaumont/Port Arthur city pair where Texas International provided the only CAB-regulated service. As of March 1, 1979, this local service carrier scheduled 20 DC-9 flights per week in that city pair (half nonstop and half one-stop) at a standard class fare of $57.41, 30 per cent above the CAB formula fare. Southwest Airlines inaugurated service in that city pair on March 5, 1979, at an executive class fare of $25.93 and operated 38 weekly nonstop round trips.[10] Thus, Texas International's standard class fare was 121.4 per cent higher than Southwest's highest fare, rather than the 71.4 per cent difference that would have existed had a trunk carrier provided service at the formula fare of $44.44.

Of course, the passenger-mile costs of serving low-density city pairs may be higher than the costs of serving city pairs with appreciably greater traffic density and therefore the fares of intrastate carriers in those city pairs would also be higher (notwithstanding Southwest's low fares in Dallas-Beaumont/Port Arthur). However, a study of intrastate carrier fares in California low-density city pairs from 1952 to 1965 found that their fares were also appreciably lower than the CAB-approved fares in those city pairs [Jordan (b), pp. 115-133]. Thus, the general conclusion regarding CAB-regulated airlines having higher fares also applies to such city pairs as well as to high-density city pairs.

The five Canadian regional carriers have generally matched the fares of Air Canada and CP Air in those city pairs where they provide rival service, while adopting different fares in their monopoly city pairs. A common policy among these carriers has been to charge higher fares per mile in city pairs lying on their northern routes relative to the fares per mile for city pairs on their southern (predominantly east-west) routes. In their submissions to the Air Transport Committee for the fare increase authorized in April 1979 [CTC(A) Decision 5903 (Aug. 16, 1979)] the regional carriers presented their formulas for calculating their new (and sometimes their old) fares. These formulas are summarized in Table 2 and they demonstrate the differences that exist between northern and southern fares.

Nordair had the most explicit fare formulas and, importantly, its "old formula" applied to the fares in effect as of December 31, 1978. Therefore, it has been selected for more detailed study. Several facts emerge from such a study. First, it turns out that Nordair's fare calculations are often based on mileages computed as actually flown via intermediate stops rather than on nonstop mileages as is generally the case for Canadian mainline and U.S. trunk carriers. Second, some of the mileages used appear to be erroneous. For example, Nordair specifies 340 miles for Montreal-Toronto and 434 miles for Great Whale-Val D'Or (in both of which it provides nonstop services) even though the nonstop distances are reported to be 315 and 500 miles, respectively.[11] Third, even using its own mileages, Nordair's formulas yield fares both higher and lower than the fares actually adopted. In many cases, Nordair is quite correct when it says that it "has developed fare formulae <u>towards</u> which individual fares have been adjusted" (emphasis added) [Nordair, CTC(A) Exhibit 1N, Nov. 13, 1978, p. 2].

Nordair's fares per mile have been plotted on Figure 2 together with the line depicting fares per mile derived from the formula for the Canadian mainline carriers. Using Nordair's own mileages, it can be seen that the fares per mile for its southern routes generally lie relatively close to those for the transcontinental routes of the Canadian mainline carriers. However, if Nordair's fares were divided by nonstop mileages (to correspond with the mainline carriers' practice) the fares per mile would be increased by up to 25 per cent, with most increases being between one and nine per cent. Thus, the majority of the fares per mile would lie on or somewhat above the mainline carrier line.

Table 2

Fare Formulas of the Regional Carriers
Before and After April 9, 1979

Carrier and Routes	Old Formula	New Formula	
Eastern Provincial			
Southern	$29.50 + 8.25¢/mi.	$31.00 + 8.66¢/mi.[a]	
Labrador	n.s.	1.50 + 0.41 "	over old fares
Nordair[b]			
Southern	$20.00 + 9.8¢/mi.	$21.00 + 10.3¢/mi.	
Northern	42.00 + 12.4 "	44.50 + 13.1 "	
Transborder	34.00 + 9.8 "	35.70 + 10.3 "	
Pacific Western[c]			
Mainline	n.s.	$28.00	0 - 100 miles
		28.50 + 15¢/mi.	101 - 200 "
		43.50 + 14 "	201 - 300 "
		57.50 + 12.5"	301 & over "
Sub-Contracts	n.s.	$28.00	1 - 87 miles
		32¢/mi.	88 - 100 "
		32.00 + 17.9"	100 & over "
Quebecair[d]			
Southern	n.s.	$26.25 + 11.85¢/mi.	
Northern[e]	n.s.	29.50 + 13.10 "	
Transair	n.s.	n.s.	

Sources: Eastern Provincial, CTC(A) Exhibit 6E, Feb. 15, 1979; Nordair, CTC(A) Exhibit 1N, Nov. 13, 1978; Pacific Western, CTC(A) Exhibit 1P, Nov. 7, 1978; Quebecair, CTC(A) Exhibit 1Q, n.d.; OAG, May 1, 1979

n.s. -- not specified in the material available to this writer

[a]A ceiling of five per cent was imposed to reduce the effect of the formula on short stage lengths.

[b]Individual fares adjusted towards these formulas

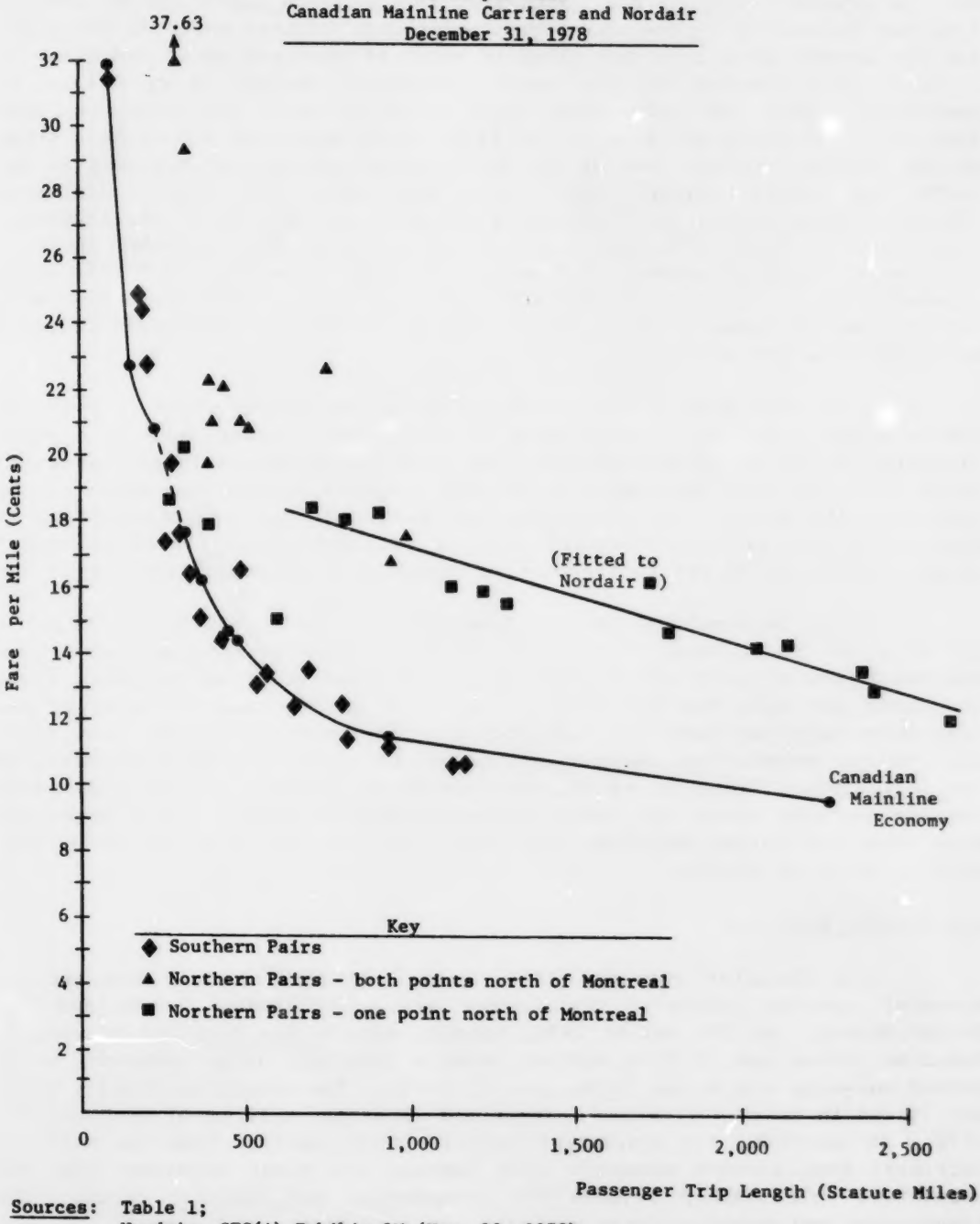
[c]"All fares over Vancouver are calculated on the above mileage formula plus a $10.00 transfer fee at Vancouver except Seattle $8.00 transfer fee." The new Calgary-Edmonton Airbus fare of $26.85 (15.7¢/mi.) was not calculated on the new formula.

[d]"No particular sector fare should be increased by more than 10% excluding the rounding up or down to the next higher or lower dollar.... Minor adjustments in the order of one dollar were necessary on a few sectors so as to obtain reasonable fares consistent with our objectives."

[e]Includes the Gaspé and the Magdalen Islands

Figure 2

Fares per Mile
Canadian Mainline Carriers and Nordair
December 31, 1978



Sources: Table 1;
Nordair, CTC(A) Exhibit 1N (Nov. 13, 1978)

Figure 2 also shows that as of December 31, 1978, most of the fares per mile for the northern pairs of points were appreciably higher than those for the southern city pairs. Actually, the northern pairs can be grouped into two categories -- one where both points are located north of Montreal, and the second where only one point is north of Montreal while the other is a large city located in the south (Montreal, Quebec City, Ottawa or Hamilton). With two exceptions (Fort Chimo-Val D'Or and Frobisher Bay-Resolute), the fares per mile of the first group were much higher than those of the second. Indeed, two of the pairs of points located entirely in the north had exceptionally high fares per mile for their distances (Chibougamau-La Grande at 37.63 cents per mile for 295 miles and Asbestos-Fort Chimo at 29.28 cents per mile for 321 miles). The remainder of these pairs were clustered between 19.7 and 23 cents per mile for 394 to 754 miles [Nordair, CTC(A) Exhibit 1N, Nov. 13, 1978, pp. 5-8]. The fares per mile for this entire group of pairs ranged from 25 to 105 per cent above Canadian mainline fares per mile.

There were also a few exceptions among the second group of pairs of points which included a large city in the south. These were four pairs clustered around Montreal (Montreal-Val D'Or/Chibougamau/Matagami/LaGrande) whose fares per mile were equal to or only slightly higher than those of the southern city pairs. If these four are excluded, the remaining pairs of points all lie along a downward sloping straight line (fitted visually) lying about 40 to 50 per cent above the Canadian mainline carrier line.

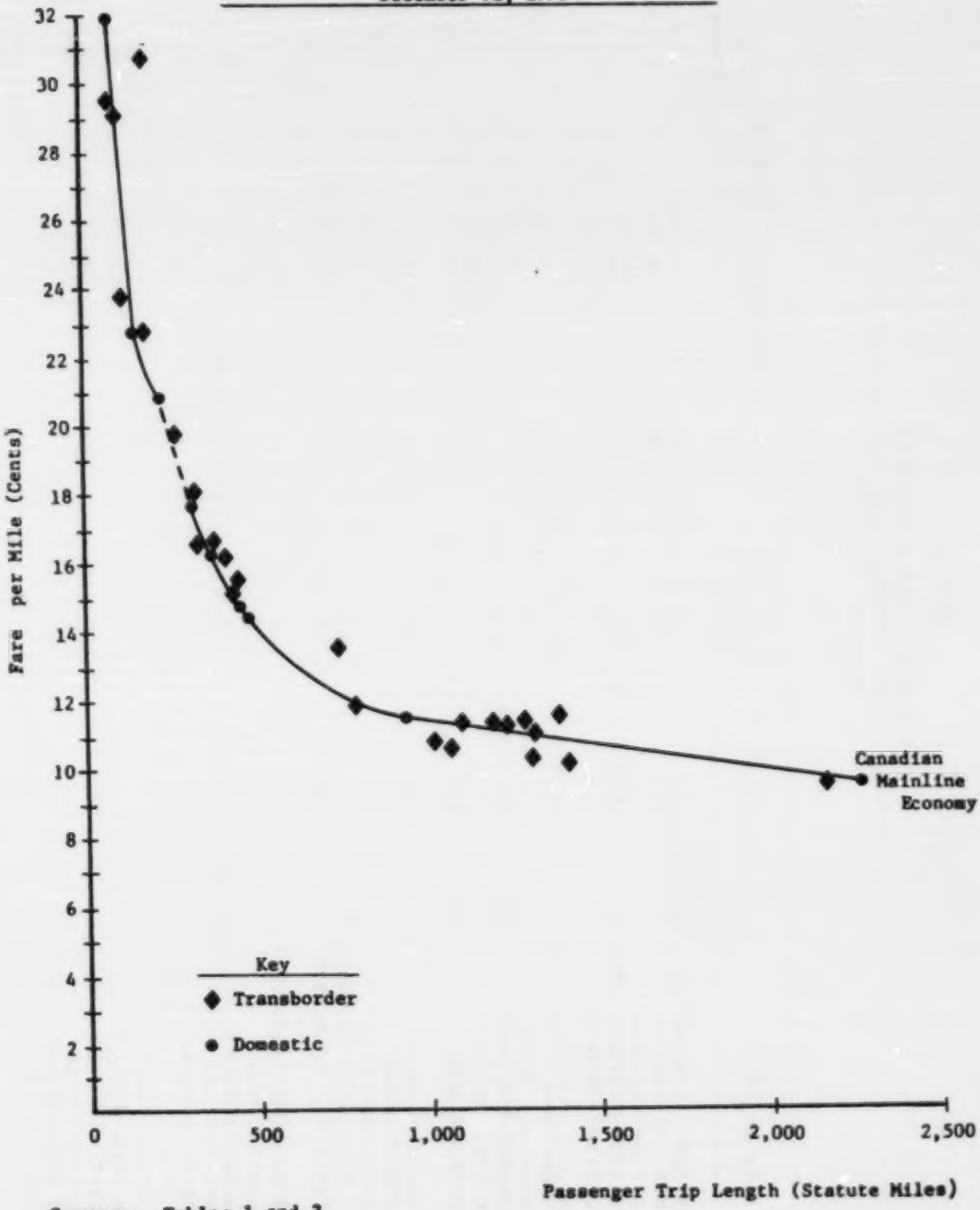
It can be concluded that in late 1978 and early 1979 Nordair's fares per mile for the southern city pairs (plus the four pairs clustered around Montreal) were slightly above those of the Canadian mainline carriers, while its fares per mile for the northern pairs of points were at least 25 per cent above mainline fares per mile and generally more than 40 per cent higher. To the extent that Nordair represents the remaining regional carriers (as indicated in Table 2), it follows that these carriers and the U.S. local service carriers share the common characteristic of having higher fares per mile than the larger mainline and trunk carriers for many of their low-density pairs of points.

Transborder Services

Four Canadian carriers (Air Canada, CP Air, Nordair and Pacific Western) operate scheduled transborder services between Canada and the United States. At the end of 1978, nonstop service was provided between 11 Canadian cities and 11 U.S. cities, with a 12th U.S. city, Houston, being served one-stop via Dallas (OAG, Jan. 1, 1979). The resulting 25 city pairs are listed in Table 3 with their fares and fares per mile as of December 31, 1978. In addition, the equivalent domestic fares derived from the mainline carriers' then current domestic fare formula are given together with the percentage relationship between the transborder and domestic fares. The transborder and domestic fares per mile are also drawn in Figure 3.

Figure 3

Fares per Mile
Canadian Domestic and Transborder City Pairs
December 31, 1978



Sources: Tables 1 and 3

Table 3

Transborder Fares per Mile
Air Canada, CP Air, Nordair and Pacific Western
December 31, 1978

City Pair[a]	Mileage[b]	Domestic Formula Fare	Transborder Economy		
			Fare	Fare per Mile	Per Cent of Formula Fare
Seattle-Victoria[d]	98	$ 30[g]	$ 29	29.59c	96.7%
Cleveland-London	117	34[h]	34	29.06	100.0
Seattle-Vancouver[d]	126	36[i]	30	23.81	83.3
Hamilton-Pittsburgh[e]	185	40[j]	57	30.82	142.5
Cleveland-Toronto	193	43[k]	44	22.80	102.3
Boston-Yarmouth	268	52	53	19.78	101.9
Boston-St. John	326	56	59	18.10	105.4
Montreal-New York	342	58	57	16.67	98.3
New York-Toronto	372	60	62	16.67	103.3
Boston-Halifax	412	63	67	16.26	106.3
Chicago-Toronto	435	65	66	15.17	101.5
Boston-Toronto	445	66	69	15.51	104.5
Chicago-Montreal	745	91	101	13.56	111.0
San Francisco-Vancouver[f]	800	96	95	11.88	99.0
Calgary-San Francisco	1,019	114	110	10.79	96.5
Los Angeles-Vancouver[f]	1,081	119	114	10.55	95.8
Tampa-Toronto	1,097	120	122	11.12	101.7
Dallas-Toronto	1,198	128	135	11.27	105.5
Miami-Toronto	1,236	131	135	10.92	103.1
Houston-Toronto	1,281	135	150	11.71	111.1
Montreal-Tampa	1,300	137	133	10.23	97.1
New York-Winnipeg	1,306	137	142	10.87	103.6
Calgary-Chicago	1,382	144	160	11.58	111.1
Miami-Montreal	1,406	145	143	10.17	98.6
Los Angeles-Toronto	2,170	209	207	9.54	99.0

Sources: Air Canada (b), Table 2-4; ATPC (c), 25th rev. p. 78-C and 12th rev. p. 78-F (eff. Dec. 7, 1978), 18th rev. p. 113 (eff. Oct. 29, 1978), and 36th rev. p. 136 (eff. Dec. 1, 1978); CTC (Research) -- based on latitudes and longitudes of airport control towers; OAG, Jan. 1, 1979

[a]Served by Air Canada, unless otherwise specified

[b]Statute miles, nonstop airport-to-airport distances

[c]$29.50 start up charge plus 8.25 cents per mile, unless otherwise noted

[d]Served by Pacific Western

[e]Served by Nordair

[f]Served by CP Air

[g]Based on the adjusted fare for Montreal-Ottawa (94 miles)

[h]Based on the adjusted fare for Halifax-Moncton (119 miles)

[i]Based on the adjusted fare for Fredericton-Moncton (129 miles)

[j]Based on the adjusted fare for Gander-Stephenville (184 miles)

[k]Based on the adjusted fare for Toronto-Windsor (194 miles)

It can be seen from Table 3 and Figure 3 that, in most cases, the transborder fares per mile were close to those derived from the domestic fare formula (with all fares expressed in Canadian dollars). In only five out of the 25 city pairs were there large differences. Hamilton-Pittsburgh (Nordair) was 42.5 per cent above the fare for an equivalent domestic city pair; Seattle-Vancouver (Pacific Western) was 16.7 per cent below the domestic norm; and Chicago-Montreal, Houston-Toronto and Calgary-Chicago (Air Canada) were all 11 per cent above the domestic formula level. The other 20 fares, however, ranged from just 4.2 per cent below to 6.3 per cent above the domestic formula fares. This close conformance between transborder and Canadian domestic fares is, of course, consistent with the similarity between the fares in the two countries derived from the domestic formulas used by the larger federally-regulated airlines.

Summary

Three conclusions follow from the above analyses. First, through 1978 North American fares were very similar for airline services operated between medium and larger cities, whether the service was operated within each country or between the two countries. Second, in both countries the smaller, federally-regulated airlines tended to charge higher fares for low-density city pairs where they provided the only service. The U.S. local service carriers' fares were allowed to be as much as 30 per cent higher than the trunk carriers' fares for the same distances, while (based on Nordair's fares) the Canadian regional carriers' northern fares were generally 40 per cent or more higher than the formula fares of the mainline carriers. Third, the intrastate carriers operating in California, Florida and Texas consistently had very much lower fares than the coach/economy fares of the federally-regulated airlines. The domestic formula fares of the federally-regulated airlines in both countries were 50 to 100 per cent higher than the peak fares of the intrastate carriers, while they were 100 to 180 per cent higher than the off-peak (but widely available) fares of the intrastate carriers.

These large differences in the three levels of coach/economy fares (mainline/trunk, northern/local service and intrastate) first raise the question of whether or not profits are related to fare levels (with high fares yielding high profits and low fares yielding low profits). If fare levels and profits are <u>not</u> closely related, as appears to be the case, it follows that there must be large differences in operating costs. The questions then become, Why do such cost differences exist? and Are they affected by regulation? Answers to these questions will be sought in the subsequent chapters of this report.

Footnotes

1. The few deviations of Canadian mainline fares from the Canadian fare formulas have mainly involved short-haul city pairs since May 1975 (generally involving distances of under 250 miles) where the large "start up" charges in the various formulas have resulted in very high fares per

mile. In addition, an extra $1.00 has been added to the formula fare to yield the actual Montreal-Toronto fare. Finally, the 5.5 per cent maximum set for the April 1, 1978 fare increase, in conjunction with the elimination of the mileage break at 1,500 miles, resulted in the fares for distances over 2,100 miles being held slightly below the formula level [Jordan (a), pp. 72 and 76n]. Also, see letter to the Secretary, Air Transport Committee, from C.C. Glasspoole, Pricing Director, Air Canada, January 27, 1978.

2. The fares per mile for the U.S. trunk carriers drawn on Figure 1 were authorized by the CAB on October 27, 1978, but were not actually implemented by most carriers until January 8, 1979. As can be seen from Table A.1 that increase was only 0.7 per cent. One should not be misled by the fact that there were nine U.S. fare increases in 1977-78 compared with only two increases in Canada. The overall U.S. increase in 1977 was 7.2 per cent as opposed to the single Canadian increase of 7.0 per cent. In 1978, the U.S. increases totaled 6.3 per cent compared with the maximum 5.5 per cent increase in Canada.

3. During May 1974, it took an average of only $0.962 Canadian to purchase one U.S. dollar. In December 1978, an average of $1.179 Canadian was required to buy a U.S. dollar (Finance Canada, May 1977, p. 212 and April 1979, p. 217).

4. Active regulation of Air Florida by the CAB began around December 1, 1978, and its first CAB tariff was effective December 14, 1978. The new CAB-authorized standard coach fares were about 11 per cent higher than Air Florida's previous coach fares filed with the Florida Public Service Commission. Capacity-controlled economy fares, in contrast, were either unchanged (Miami-Tallahassee) or were decreased by five per cent (Miami-Tampa) in the first CAB fare filing. [Air Florida, Florida Public Service Commission Tariff No. 2, 16th rev. p. 8 (effective Sept. 20, 1978); ATPC (b), 34th rev. p. 14.]

5. Table 1 is the source of most of the fares per mile drawn on Figure 1, but it does not include the following fares per mile that also appear in Figure 1:

U.S. Trunk			Canadian Mainline		
City Pair[a]	Mileage	Fares per Mile	City Pair[a]	Mileage	Fares per Mile
BOS-NYC	185	20.02¢	YUL-YQB	145	22.76¢
NYC-DCA	214	18.17	YYZ-YOW	226	20.80
BOS-DCA	399	14.39			
MSP-DCA	931	10.54	YYZ-YWG	933	11.47
LAX-IAD	2,288	8.66	YUL-YVR	2,286	9.49

Sources: Same as for Table A.1

[a]BOS Boston
DCA Washington-Nat'l.
YOW Ottawa
YQB Quebec City

IAD	Washington-Int'l.	YUL	Montreal
LAX	Los Angeles	YVR	Vancouver
MSP	Minneapolis	YWG	Winnipeg
NYC	New York-La Guardia	YYZ	Toronto

6. Prior to December 14, 1978, Air Florida's lowest fares were also for night and weekend flights. See Table A.2.

7. The exception of Air Florida's initial, CAB-approved standard fares must not be ignored, but they should be evaluated in conjunction with Air Florida's simultaneous introduction of capacity-controlled economy fares that were also available on all weekday flights. During January 1979, 49.2 per cent of Air Florida's Miami-Tampa passengers and 40.2 per cent of its Miami-Tallahassee passengers used the low, capacity-controlled fares [Air Florida (c)].

8. CAB (j), March 18, 1974, and (l), 43 FR 172 (Sept. 5, 1978), p. 39528.

9. For an example of the wide variety of increases actually implemented within the 30 per cent interval, see the listing of "S-FARE PERCNT" (sic) for Frontier Airlines in ATPC (e), pp. 96-116.

10. Official Airline Guide (OAG), March 1, 1979. One year earlier, when there was no need to consider Southwest's pending entry, Texas International operated 27 weekly round trips in this city pair, half nonstop and half one-stop (OAG, March 1, 1978).

11. Mileages as given in Nordair, CTC(A) Exhibit 1N (Nov. 13, 1978), as opposed to those given in CTC(Research), based on latitudes and longitudes of airport control towers.

Chapter II

PROFITS

Two common measures of profit used in transportation are return on investment and operating ratio.[1] The operating ratio measure will be used here because it provides an adequate indication of relative profitability among carriers, yields estimates of carrier profitability by area of operation without the arbitrariness inherent in allocating total corporate investment by geographic areas, and is a reasonably unambiguous measure.

Total operating revenues, operating expenses and net income after taxes for 1975-78 are presented in Appendix C for 18 individual carriers. These comprise the two Canadian mainline and five regional carriers, three U.S. trunk and four local service carriers, and the four major U.S. intrastate carriers. As explained in footnote 3 of the Introduction, Trans World and Northwest were selected from among the 11 U.S. trunk carriers because their route structures were similar to those of Air Canada and CP Air, respectively, while Delta was chosen to provide a carrier with the majority of its operations in the southern parts of the United States where relatively moderate weather conditions prevail. Similarly, Allegheny, Frontier and North Central were selected from among the eight U.S. local service carriers because during 1975-78 the majority of their routes were in the northern United States and Canada. Southern was chosen because of its predominantly southern network and because, like Delta, it was based in Atlanta. This selection of carriers should eliminate many differences that could be due to dissimilar route structures, while providing an opportunity for major effects of weather (if any) to become apparent.

Operating ratios calculated from revenue and expense data for 1977-78 are presented in Table 4. They demonstrate that profits have <u>not</u> been closely related to fare level. If a positive relationship existed between profits and fare levels, the high-fare Canadian regional and U.S. local service carriers should have had the highest profits, while the low-fare U.S. intrastate carriers should have had the lowest. In direct contradiction to this, however, the total system operating ratios in Table 4 show that the highest profits (lowest operating ratios) were enjoyed by Southwest, Delta and Nordair (low, medium and high fare carriers), while the lowest profits (highest ratios) were experienced by Air Florida, Trans World, Eastern Provincial and Quebecair (also low, medium and high fare carriers). Clearly, there is much more to profits than fare level, but this should not be surprising since profits are affected both by revenues and by costs, and the primary effect of fare level is on revenues.

In addition, the operating ratios in Table 4 yield other useful insights. First, it can be seen that during 1977 and 1978 there was considerable similarity in the profits of the federally-regulated Canadian and U.S. carriers. The simple averages of the total system operating ratios of 11 of

Table 4

Operating Ratios
Canadian Mainline, Regional and Selected U.S. Carriers
1977-78

Carrier	Operating Ratios North America 1977	North America 1978	International 1977	International 1978	Total System 1977	Total System 1978
Mainline						
Air Canada	n.a.	n.a.	n.a.	n.a.	92.5[a]	93.6[a]
CP Air	n.a.	n.a.	n.a.	n.a.	94.7[a]	90.6
Trunk						
Trans World	101.8	99.9	90.9	94.5	98.2	98.0
Northwest	88.9	91.0[a]	92.9	92.7[a]	90.0	91.4[a]
Delta	90.7	90.0	91.4	87.5	90.7	89.9
Intrastate						
Air Calif.	90.9	94.4	-	-	90.9	94.4
Air Florida[b]	154.4	98.1	-	-	154.4	98.1
PSA[c]	95.3	93.8	-	-	95.3	93.8
Southwest	79.1	73.9	-	-	79.1	73.9
Regional						
East. Prov.	104.2[d]	96.2	-	-	104.2[a]	96.2
Nordair	n.a.	n.a.	n.a.	n.a.	89.9[a]	90.7[a]
Pac. Western	n.a.	n.a.	n.a.	n.a.	96.2[a]	93.3[a]
Quebecair	n.a.	n.a.	n.a.	n.a.	95.8[a]	97.8[a]
Transair	n.a.	n.a.	n.a.	n.a.	92.5[a]	92.9[a]
Local Service						
Allegheny	94.8	94.0	-	-	94.8	94.0
Frontier	88.9	95.4	-	-	88.9	95.4
N. Central	92.3	88.4	-	-	92.3	88.4
Southern	95.3[e]	95.9[e]	-	-	95.3	95.9

Source: Calculated from data in Appendix C

n.a. -- not available due to confidentiality of CTC(A) Statement 16 (see comparable note in Appendix C)

[a]Service was interrupted by one or more strikes having a significant impact on operations (see Appendix D).

[b]Fiscal years ended July 31, 1977 and July 31, 1978

[c]Applies to PSA, Inc., including the following subsidiaries in addition to the airline: Pacific Southwest Airmotive (maintenance services), Airline Training Center and Jetair Leasing, Inc. Airline and Airmotive revenues together accounted for 97.8 and 97.9 per cent of the corporate total in 1977 and 1978.

[d]Includes international charter operations totaling $125,065 out of a total of $42,264,521 in revenues in 1977

[e]Includes a small amount of international service (one daily round trip) between Miami and Grand Cayman, B.W.I.

these 14 carriers fell between 90 and 96, with the exceptions being Trans World, Eastern Provincial and Quebecair (all on the high side). Indeed, the simple average of the operating ratios for Air Canada and CP Air for these two years was 92.8, compared with 93.0 for the three selected U.S. trunk carriers. The five Canadian regional carriers had a simple average of 95.0 while the four selected U.S. local service carriers had an average of 93.1.

Second, in contrast to the similarity among the regulated airlines, considerable diversity in profits existed among the low-fare U.S. intrastate carriers. On the high side, fledgling Air Florida radically bettered its performance by reducing its operating ratio from 154.4 in 1977 to 98.1 in 1978. On the low side, Southwest's superior and improving performance gave ratios of 79.1 and 73.9. In the meantime, the older Air California and PSA had "normal" operating ratios yielding a simple average of 93.6.[2]

Another conclusion indicated by the operating ratios is that profit performance can differ in the major areas of operation. Among the U.S. trunk carriers, TWA did relatively better in its international service than it did in North America. The profit performances of Delta and Northwest, however, were fairly consistent between the two areas of operation, but profits did tend to be somewhat higher in North America than internationally. It is regrettable that comparable information is not available for the Canadian carriers.

A final matter concerns weather. It has been argued that adverse weather increases costs and (given comparable fare levels) decreases profits. If weather were a major factor, one would expect to find U.S. carriers operating mainly in the north to have lower profits than those operating primarily in the south since all CAB-regulated airlines calculated their fares from the same distance-related fare formula during these years. Table 4 shows that Delta (a predominantly southern airline) did have relatively low operating ratios; but so did Northwest despite the fact its primary routes extended along the northernmost edge of the United States and on to Alaska and across the North Pacific. At the same time, Southern was a relatively low-profit carrier among the local service carriers even though it served the U.S. south. In contrast, Allegheny, Frontier and North Central all had operating ratios that were better than Southern's despite their routes being in the northern United States and extending on into Canada. The effects of weather will be considered further later in this study, but this first piece of evidence does give reason to question the belief that weather differences play a major role in airline operating costs.

The primary use of these operating ratio (profit) data has been to determine whether or not there has been a positive relationship between fare levels and profits. It turns out that this has not been the case. Therefore, it is necessary to investigate cost factors to discover why some airlines could operate profitably at low fares while other carriers required high fares to be profitable. Since the differences in fare levels are very large, the differences in costs must also be large. Indeed, since one of the low-fare carriers was also the most profitable in 1977-78, the cost dif-

ferences may be even larger than the fare differences. Furthermore, since the high-fare carriers were all federally regulated, the possible effects of such regulation on costs deserve recognition. The remainder of this study will analyze a number of factors in an effort to identify the reasons for cost differences among the airlines.

Footnotes

1. Return on investment is defined as after-tax net income plus interest as a per cent of long-term debt plus current obligations under capital leases plus stockholder equity. Operating ratio is calculated by dividing total operating expenses by total operating revenues (and multiplying the result by 100).

2. Air California inaugurated service in January 1967 and PSA has provided scheduled service since May 1949. Air Florida began operating in September 1972 and Southwest in June 1971. See the annual reports of Air California (1967), Air Florida (1976) and Southwest (1971), and Jordan (b), p. 259.

Chapter III

COST DIFFERENCES

Differences in Operating Expenses per RTM

Major differences do exist between the operating costs of the federally-regulated airlines and the low-fare intrastate carriers once the effects of distance are taken into account. This can be seen in Figure 4 where the weighted average of each carrier's total system operating expenses per revenue ton-mile (RTM) for the four years from 1975 through 1978 are plotted against its average system trip length for combined scheduled and charter passengers.[1] Also depicted is the trend line giving the best fit for the federally-regulated airlines' data from among six possible mathematical relationships.[2] The actual values for the two variables, the trend line values, and the numerical and percentage deviations of the actual from the trend line values for operating expenses per RTM are all given in Table 5.

The close association between distance and operating expenses per RTM for the federally-regulated airlines is indicated by the high, and statistically significant, R^2 of .886.[3] At the same time, the appreciably lower operating expenses per RTM of the three largest U.S. intrastate carriers (excluding Air Florida) are clearly evident from Figure 4, and from the 31.8 to 52.8 per cent deviations of their actual operating expenses per RTM from the federally-regulated airlines' trend line values given in Table 5. These large differences are similar to the differences in fare levels found in Chapter I and they demonstrate why the intrastate carriers (except Air Florida) were able to achieve average or high profits while charging low fares.

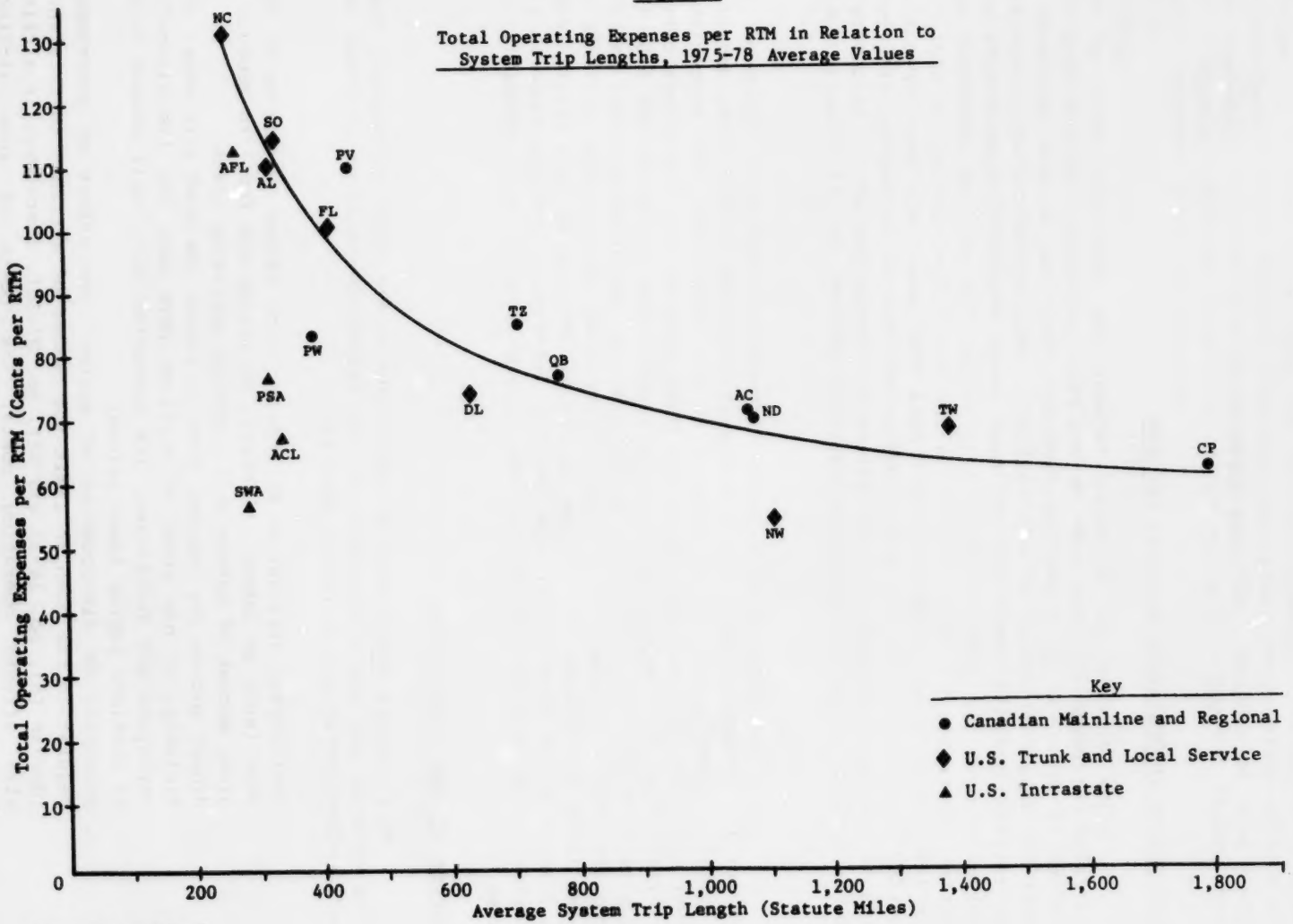
Sources of Cost Differences

Many factors could cause or contribute to the major differences that exist between the operating costs of the federally-regulated airlines and the low-fare intrastate carriers, such as:

1. Inefficient utilization of inputs: Using larger quantities of inputs (such as labour, aircraft, buildings and fuel) to produce a given amount of output will increase operating costs.
2. Higher prices for inputs: Even if inputs are used with equal efficiency, if one group of airlines pays more for its aircraft, employees and facilities, its operating costs will exceed those of carriers paying lower prices.
3. Economies or diseconomies of scale: One effect of government regulation has been to limit the number of airlines in existence [Jordan (b), pp. 24-32 and (c), pp. 23-30]. Therefore, if airline size affects operating costs, the costs of some airlines

Figure 4

Total Operating Expenses per RTM in Relation to System Trip Lengths, 1975-78 Average Values



Source: Table 5

Table 5

Total System Operating Expenses per RTM and System Trip Lengths
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	System Trip Length[a]	1975-78 Average Operating Expenses per RTM (Can. & U.S. Cents) Actual	Trend[b]	Deviation ¢ per RTM[c]	Per Cent[d]
Mainline					
Air Canada	1,064	71.5¢	68.6¢	2.9¢	4.2%
CP Air	1,789	61.9	60.9	1.0	1.6
Trunk					
Trans World	1,390	68.6	64.1	4.5	7.0
Northwest	1,110	54.8	67.8	-13.0	-19.2
Delta	636	74.3	81.4	-7.1	-8.7
Intrastate					
Air Calif.	341	67.5[e]	108.9	-41.4	-38.0
Air Florida	268	112.7[f]	125.1	-12.4[f]	-9.9[f]
PSA	318	77.2	113.2	-36.0	-31.8
Southwest	284	57.0	120.8	-63.8	-52.8
Regional					
East. Prov.	444	110.0	95.1	14.9	15.7
Nordair	1,067	70.5	68.5	2.0	2.9
Pac. Western	383	83.1	102.4	-19.3	-18.8
Quebecair	771	76.7	75.8	0.9	1.2
Transair	707	85.0	78.2	6.8	8.7
Local Service					
Allegheny	323	110.5	112.2	-1.7	-1.5
Frontier	406	101.4	99.4	2.0	2.0
N. Central	253	131.9	129.5	2.4	1.9
Southern	329	114.9	111.1	3.8	3.4

Sources: Calculated from data in Appendices C, E, G and H

[a]Total system scheduled plus charter RPM divided by total system passengers yields distance in statute miles.

[b]Calculated from data for the federally-regulated airlines using the equation: $Y = 49.582 + 20{,}227.564/X$, $R^2 = .866$

[c]Actual operating expenses per RTM minus trend values

[d]Deviation per cent of trend value

[e]Partially estimated. Scheduled passenger RTM for 1975-76 were assumed to be 98 per cent of total RTM (based on 1977 experience).

[f]Year ended July 31, 1978. RTM were estimated by averaging data for calendar years 1977 and 1978. The deviation from 1975-78 trend value may be somewhat understated due to the effects of inflation.

will be higher if regulatory decisions prevent them from becoming large enough to achieve full economies of scale, or if such decisions require them to become so large that they experience diseconomies of scale.[4]

4. Volume of operations: Services provided with large aircraft, between large cities and over long distances, tend to have lower average costs than services produced with small aircraft between points having small populations and located close to each other.
5. Output rate: Rapid production tends to increase costs. For example, flying aircraft at their highest cruising speeds, processing passengers with little or no delay (for reservations, ticketing, check-in, baggage handling, etc.), and reducing aircraft ground time at intermediate stops, could all increase operating costs.
6. Variety of output: The more variety in operations, the higher the costs. Examples of variety are the number of aircraft types operated, number of airports served, classes of service and range of discount fares offered, provision of both passenger and cargo services, diversity of geographic coverage (Arctic vs. southern, domestic vs. international), whether charter service is operated in addition to scheduled service, and so on.
7. Aggregation of traffic flows: While variety of output increases costs, lower costs can be achieved by the aggregation of diverse individual requirements from point-to-point service into a small number of homogeneous flights. Thus, for example, carrying passengers between a number of cities located along a roughly linear route should cost less than transporting an equal number of passengers the same distances between an identical number of points, but where these points are located on a diverse route network having segments at right angles to each other, thereby requiring service by many stub-end flights that can efficiently connect only two or three points.
8. Interval for implementing change: Adopting new ideas and technology can be beneficial, but doing so over a short time period is more costly than taking a longer interval of time. For example, buying and introducing a new type of aircraft as quickly as possible will be more costly than doing so over a longer time period. Of course, if the new type of aircraft yields lower operating costs, this benefit may be greater than the increased costs resulting from its rapid introduction. If, however, it primarily improves service quality without reducing costs, the increase in costs of its rapid introduction could be relatively large.[5]
9. Geographic factors: Weather and topography may also influence operating costs. An airline operating at high-altitude airports having hot temperatures during much of the year will either need aircraft with more powerful engines (and higher fuel consumption) for takeoffs or it must sacrifice payload. Airports in remote or difficult locations will be more costly to build and operate and may have fewer facilities -- all of which result in higher charges and costs to the airlines operating there. Heavy snow,

fog and other adverse weather conditions can result in delayed or canceled flights. Extremes of cold or hot weather can decrease employee productivity and require expenditures for heating or air conditioning.

10. Costs of economic regulation: Regulation itself can directly affect operating costs in at least two ways. First, the managerial, legal, accounting, statistical and economic personnel (and associated facilities) required to comply with regulatory rules, procedures and practices result in higher operating costs. But the salaries paid to these talented and highly skilled individuals is just one aspect of their costs. Another is the diversion of their talents from operating/marketing problems and innovations to regulatory activities. Second, regulatory delays in the timely implementation of decisions can also serve to increase airline costs.

Implicit in most of the above factors is the assumption that the qualities of service offered by various airlines are roughly equal. If there are appreciable differences in service quality, then operating costs should also differ regardless of the above cost factors. Examples of higher service quality in airline passenger service would include larger seats and more leg room, lower load factors, higher flight frequencies, newer aircraft, better meal and beverage service, in-flight entertainment and faster passenger handling. All of these would increase costs on the basis of some common unit of output, such as passenger miles or revenue ton-miles. Thus, allowances should be made for such service quality differences in undertaking intercarrier cost comparisons.

It should also be recognized, however, that service quality can affect costs in two ways. First, if service quality is higher, there are the added costs of producing that higher quality, just as there are higher costs in producing Cadillac rather than Chevrolet automobiles. Second, if service quality results in an airline producing two or more classes of service, rather than just one, the greater variety of service will increase costs (see item 6, above). Adjustments should be made for the first source of increased costs when comparing operating costs between two or more carriers. The second source is relevant, however, when making intercarrier cost comparisons since it is a result of service variety and not necessarily improved service quality. Indeed, it would be incurred even if the new level of service were inferior rather than superior to the existing service. (An example of the adoption of inferior service quality can be found in the introduction of economy/coach service during the 1950s.)

Summary

This chapter has shown that large differences in operating costs existed during 1975-78 between the federally-regulated airlines and the U.S. intrastate carriers after adjusting for the effects of distance. The long list of factors that may affect costs implies that identifying the reasons for operating cost differences is a complicated and difficult task. If cost

differences among the airline groups were small, it might well be impossible to determine the factors accounting for an appreciable portion of the differences. It happens, however, that the differences are large. Thus, it should be possible to isolate some of the important factors and estimate their relative effects on costs. We are not looking for the proverbial needle in the haystack. Rather, we are trying to determine why one haystack had to be almost twice the size of another in order to produce a unit of output.

Footnotes

1. Average system trip length is calculated by dividing total system revenue passenger-miles (RPM) by total system passengers. As explained in the footnotes in Appendix H, there are some inconsistencies among these carriers in how they count passengers. All U.S. trunk and local service carriers, plus Air California, count passengers each time they board an aircraft. Thus, intracarrier connecting passengers are counted two or more times. This yields enplaned passenger data. In contrast, Air Florida, PSA and Southwest count passengers only when they originate on their systems, thereby yielding originating passenger data. (There is a minor exception for PSA.) Air Canada is also thought to count its domestic passengers only when they board their initial flights, but domestic passengers transferring to or from international and transborder flights are believed to be counted again at the point of transfer. CAB data for 1969 indicate that enplaned passengers exceed originating passengers by around nine per cent for domestic trunk carriers and six per cent for local service carriers. Therefore, the number of passengers reported by Air Canada, Air Florida, PSA and Southwest will be somewhat smaller than the other carriers, making their calculated average trip lengths somewhat longer. These differences are too small to affect the conclusions of this study.

2. The six mathematical relationships and their R^2 are as follows:

1. $Y = 117.689 - .041X \quad R^2 = .664$
2. $Y = 120.409e^{-.000*x} \quad R^2 = .701$
3. $Y = 1{,}011{,}356X^{-.385} \quad R^2 = .823$
4. $Y = 49.582 + 20{,}227.564/X \quad R^2 = .866$
5. $Y = 1/(.008 + .000*X) \quad R^2 = .712$
6. $Y = X/(.017 - 2.619X) \quad R^2 = .799$

*Designates significant value beyond three decimal points.

Based on the lowest mean squared error, the best fit was equation number 4.

3. For a random sample of 14 pairs, the five per cent level of significance is achieved at an R^2 of .283, while the one per cent level of significance obtains at an R^2 of .437 (Richmond, 1957, p. 459). The 14 federally-regulated airlines selected for this study do not constitute a

random sample. They do, however, comprise more than 50 per cent of the 26 federally-regulated airlines operating large aircraft in scheduled passenger/cargo service in Canada and in the 48 contiguous states of the United States.

4. These first three factors are implications from traditional production and cost theories to be found in any intermediate level microeconomic textbook, for example, Leftwich, 1978, Chapters 8 and 9.

5. Factors 4 through 8 are implications of a more recent cost theory proposed by A.A. Alchian, 1959, pp. 23-40 and J. Hirshleifer, 1962, pp. 235-55.

Chapter IV

DESCRIPTIONS OF THE AIRLINES

A detailed study of the operating costs of the Canadian and selected U.S. carriers will be facilitated by brief descriptions of their relative sizes, the geographic distributions of their services, and the relative importance of scheduled passenger, scheduled cargo and charter traffic in their overall operations. Revenue ton-miles (RTM) provide the most inclusive physical measure of traffic, and RTM data for 1975-78 are presented in Appendix E for each carrier by major geographic area of operation and by traffic category. These data provide the basis for the following comparisons of the basic characteristics of the airlines included in this study.

Relative Sizes

Table 6 shows the relative sizes of the total system operations of the 18 carriers through the use of index numbers, with Air Canada as the base carrier and assigned an index number of 100. Except where indicated, the index numbers are calculated from total RTM data aggregated for all four years. It can be seen that Air Canada was, and is, by far the largest Canadian carrier. The RTM index numbers for CP Air and the five regional carriers totaled just 64.4, which means that, combined, these six airlines carried only 64.4 per cent as many RTM as Air Canada. Put another way, during 1975-78 Air Canada accounted for 61 per cent of the total system RTM transported by all seven airlines, with CP Air accounting for 24 per cent and the five regional carriers the remaining 15 per cent.

While Air Canada was large, the U.S. trunk carriers under study were even larger. During 1975-78, Trans World carried more than twice as many RTM as Air Canada, Delta almost 50 per cent more and Northwest 13 per cent more (based on 1975-77 data for both carriers). If ranked among all the U.S. trunk carriers, Air Canada would be in eighth position (between Northwest and Western), while CP Air would be ranked thirteenth and last, after National [CAB (p), 1977 and 1979; Appendix E].[1] Thus, while it is a giant among Canadian carriers, Air Canada is a medium-sized carrier by U.S. standards.

The Canadian regional carriers were generally smaller than the U.S. local service carriers. For the 1975-78 period the RTM index number for the regional carriers ranged from 2.6 to 9.1 (per cent of Air Canada) compared with 8.5 to 27.3 for the U.S. local service carriers. Only Pacific Western, the largest of the Canadian regional carriers, produced more RTM during 1975-78 than Southern, the smallest of the U.S. local service carriers (ibid.).

Lest the impression be given that almost all of the Canadian carriers were smaller than the U.S. carriers with which they are compared, it

Table 6

Relative Sizes and Geographic Distribution of Operations
Canadian Mainline, Regional and Selected U.S. Carriers
Based on Revenue Ton-Miles Aggregated for 1975-78[a]

Carrier	Relative Sizes Total System RTM Air Canada = 100	Geographic Distribution Per Cent of Total System RTM			
		Domestic	Transborder	N. America	Int'l.
Mainline					
Air Canada	1[illegible]	50.0%	15.1%	65.1%	34.9%
CP Air	40.[illegible]	34.7	14.5	49.2	50.8
Trunk					
Trans World	209.2	64.0	0	64.0	36.0
Northwest[b]	113.0	n.a.	n.a.[e]	67.3	32.7
Delta	148.4	n.a.	n.a.[e]	97.0	3.0
Intrastate					
Air Calif.[c]	5.2	100.0	0	100.0	0
Air Florida[d]	1.2	95.0[f]	0	95.0[f]	5.0[f]
PSA	15.2	100.0	0	100.0	0
Southwest	4.1	100.0	0	100.0	0
Regional					
East. Prov.	2.6	77.3	22.7	100.0	-[g]
Nordair	5.0	38.4	19.1	57.5	42.5
Pac. Western	9.1	62.6	14.5	77.1	22.9
Quebecair	4.9	39.3	9.9	49.2	50.8
Transair	2.8	62.1	15.9	78.0	22.0
Local Service					
Allegheny	27.3	n.a.	n.a.[e]	100.0	0
Frontier	13.6	n.a.	n.a.[e]	100.0	0
N. Central	10.3	n.a.	n.a.[e]	100.0	0
Southern	8.5	99.0	0	99.0[h]	1.0[h]

Sources: Appendix E; Air Florida, worksheets summarizing flight hours (Jan.- Dec. 1978); CAB/FAA, 1977 and 1978

[a]Four-year totals, except where noted

[b]1975-77. 1978 data are excluded due to Northwest's 108-day pilot strike.

[c]1977-78

[d]1978 only

[e]During 1977-78, Canadian stations enplaned the following percentages of total system enplaned passengers: Delta = 0.70 per cent, Northwest = 1.07 per cent, Allegheny = 1.86 per cent, North Central = 2.05 per cent and Frontier = 0.39 per cent. These percentages are probably close approximations to these carriers' transborder RTM percentages, since doubling them to account for U.S. enplaned passengers bound for Canada should be offset by the fact that the transborder operations of these carriers were primarily short-haul, stub-end extensions of domestic flights.

[f]Approximately 9.5 per cent of Air Florida's total system RTM were charter, and about 56 per cent of those were to Freeport, Bahamas. Therefore, just over five per cent of Air Florida's total system RTM in 1978 was international.

[g]Less than 0.1 per cent

[h]During 1977-78, Southern's Miami-Grand Cayman route accounted for 0.71 per cent of total system enplaned passengers. Since this route was a relatively long haul for Southern, its international RTM probably accounted for just over one per cent of total system RTM.

should be pointed out that the RTM of the U.S. intrastate carriers encompassed those of the Canadian regional carriers. Air Florida, with an index number of 1.2, produced less than half the RTM carried by Eastern Provincial during 1978 (see Appendix E), while PSA had an index number of 15.2 compared with Pacific Western's 9.1. At the same time, Air California and Southwest (index numbers 5.2 and 4.1) were about the same sizes as Nordair and Quebecair (index numbers 5.0 and 4.9).

Geographic Distributions

Table 6 also specifies the geographic distributions of RTM for the 18 carriers. It shows that there was a bimodal split among the carriers in that 10 of them operated almost entirely within North America while eight had substantial international operations. Among the 10 carriers, Delta, the U.S. local service and the U.S. intrastate carriers all provided between 95 and 100 per cent of their service within North America. Indeed, their operations were primarily domestic U.S. since it appears that even the four carriers having transborder routes carried less than two per cent of their total system RTM to and from Canada (see note e to Table 6). Eastern Provincial also specialized in North American service but, unlike the U.S. carriers, 22.7 per cent of its RTM was carried in transborder operations.

Among the eight carriers with large international operations, Table 6 shows that CP Air and Quebecair both carried 50.8 per cent of their total RTM outside of North America (let alone outside of Canada). Air Canada, Trans World, Northwest and Nordair all carried between 32.7 and 42.5 per cent of their RTM in international operations, while Pacific Western and Transair carried 22.9 and 22.0 per cent internationally.

The most surprising fact brought out in Table 6 is the relatively small role that purely domestic traffic played in the total operations of Canadian carriers. Even Air Canada carried just half of its total RTM domestically, while CP Air, Nordair and Quebecair all carried less than 40 per cent of their total system RTM solely within Canada. Only Eastern Provincial, Pacific Western and Transair carried more than half of their traffic domestically (77.3, 62.6 and 62.1 per cent, respectively). Taking all seven mainline and regional carriers together for the years 1975-78, purely domestic Canadian RTM accounted for just 47.0 per cent of total system RTM! For the same period, transborder RTM equaled 15.0 per cent of total, while international RTM were 38.0 per cent of total system RTM.[2] Obviously, as is true for the Canadian economy in general, foreign trade plays a much more important role in Canadian airline operations than it does in the U.S. airline industry. However, the differences are much less in terms of North American operations since the large transborder component of Canadian RTM brings the industry's domestic plus transborder share up to 62 per cent, which approximates the North American RTM shares of Northwest and Trans World.

Traffic Distributions

Turning now to the distribution of traffic by category, it can be seen from Table 7 that during the late 1970s all the airlines, other than the Canadian regional carriers, operated primarily scheduled service, with passengers being the major type of traffic. In fact, scheduled passengers have dominated the U.S. intrastate carriers' traffic, comprising either 90.1 (Air Florida) or 98 to 99 per cent of total system RTM. Cargo was generally less than one per cent of the total for these geographically constrained carriers, and only Air Florida operated an appreciable share of charter passenger service (9.5 per cent). An executive of Southwest Airlines expressed it very accurately when he said, "We are a people mover."[3]

The U.S. local service carriers also emphasized passenger traffic in their primarily short-haul operations, but not quite to the same extent as the intrastate carriers. Perhaps the best way to see this is to look at their total system cargo shares. During 1975-78, they operated essentially no cargo charters and only between 7.0 and 9.0 per cent of system RTM was scheduled cargo. Passenger traffic accounted for the remaining 91.0 to 93.0 per cent of system RTM and was carried mainly in scheduled operations (82.7 to 91.1 per cent). Essentially all of their service was operated in North America, with the only exception being Southern's limited service to Grand Cayman.

Air Canada, CP Air and Trans World all had very similar traffic distributions, both in North America and internationally. Within North America, around 80 per cent of their total RTM was scheduled passenger, and about 17 per cent was scheduled cargo. There was very little charter passenger traffic (0.8 to 3.2 per cent) and virtually no charter cargo traffic. Internationally, scheduled passenger traffic fell in importance to between 60.4 and 68.2 per cent, scheduled cargo rose to between 20.4 and 26.6 per cent, while charter service also rose to around 12 per cent -- all passenger for CP Air, and three-quarters passenger for Air Canada and Trans World. Systemwide, about 74 per cent of total RTM was scheduled passenger, around 20 per cent was scheduled cargo and about six per cent was charter. Relatively speaking, cargo was over twice as important to these carriers as to the local service carriers, and twenty times more important than to the intrastate carriers.

Northwest and Delta differed somewhat from the other large carriers, but in opposite ways. Northwest carried appreciably less scheduled passenger RTM (69.3 per cent domestically, only 51.6 per cent internationally and 63.6 per cent overall), while Delta was more heavily oriented to scheduled passenger service (around 86 per cent for all areas of operation). Again, charter operations in North America were very limited, with passenger charters making up almost the entire 1.5 per cent or less share of total RTM. Internationally, Northwest was heavily committed to cargo operations, with 40.3 per cent scheduled and another 1.2 per cent charter. In contrast, Delta's small (and new North Atlantic) international service emphasized scheduled passenger service (84.5 per cent). Both carriers operated relatively little international charter service, but what they did operate was, again, mainly passenger (6.9 per cent for Northwest and 4.0 per cent for Delta).

Table 7

Distribution of Traffic by Category for Each Area of Operation
Canadian Mainline, Regional and Selected U.S. Carriers
Based on Revenue Ton-Miles Aggregated for 1975-78[a]

Carrier	Traffic Category	Per Cent of Area Total RTM				
		Domestic	Trans-border	North America	Int'l.	Total System
Mainline						
Air Canada	Scheduled-Pax.*	80.9%	81.8%	81.1%	60.4%	73.9%
	Cargo	18.8	15.4	18.1	26.6	21.0
	Charter - Pax.	0.3	2.8	0.8	9.6	3.9
	Cargo	-[g]	-	-	3.4	1.2
CP Air	Scheduled-Pax.	80.0	84.8	81.5	65.5	73.4
	Cargo	19.4	9.0	16.3	22.2	19.3
	Charter - Pax.	0.6	6.2	2.2	12.3	7.3
	Cargo	0	0	0	0	0
Trunk						
Trans World	Scheduled-Pax.	79.3	0	79.3	68.2	75.3
	Cargo	17.5	0	17.5	20.4	18.5
	Charter - Pax.	3.2	0	3.2	9.0	5.3
	Cargo	-	0	-	2.4	0.9
Northwest[b]	Scheduled-Pax.	n.a.	n.a.[e]	69.3	51.6	63.6
	Cargo	n.a.	n.a.[e]	29.2	40.3	32.8
	Charter - Pax.	n.a.	n.a.[e]	1.4	6.9	3.2
	Cargo	n.a.	n.a.[e]	0.1	1.2	0.4
Delta	Scheduled-Pax.	n.a.	n.a.[e]	86.4	84.5	86.4
	Cargo	n.a.	n.a.[e]	12.4	11.5	12.3
	Charter - Pax.	n.a.	n.a.[e]	1.2	4.0	1.3
	Cargo	n.a.	n.a.[e]	-	0	-
Intrastate						
Air Calif.[c]	Scheduled-Pax.	97.6	0	97.6	0	97.6
	Cargo	0.8	0	0.8	0	0.8
	Charter - Pax.	1.6	0	1.6	0	1.6
	Cargo	0	0	0	0	0
Air Florida[d]	Scheduled-Pax.	95.2	0	95.2	0	90.1
	Cargo	0.4	0	0.4	0	0.4
	Charter - Pax.	4.4	0	4.4	100.0[f]	9.5
	Cargo	0	0	0	0	0
PSA	Scheduled-Pax.	98.0	0	98.0	0	98.0
	Cargo	1.6	0	1.6	0	1.6
	Charter - Pax.	0.4	0	0.4	0	0.4
	Cargo	0	0	0	0	0
Southwest	Scheduled-Pax.	99.0	0	99.0	0	99.0
	Cargo	0.7	0	0.7	0	0.7
	Charter - Pax.	0.3	0	0.3	0	0.3
	Cargo	0	0	0	0	0

Table 7 (continued)

Carrier	Traffic Category	Per Cent of Area Total RTM				
		Domestic	Trans-border	North America	Int'l.	Total System
Regional						
East. Prov.	Scheduled-Pax.*	84.7%	2.5%	66.0%	0%	66.0%
	Cargo	13.6	0	10.5	0	10.5
	Charter - Pax.	1.7	97.5	23.5	100.0	23.5
	Cargo	-[g]	0	-	0	-
Nordair	Scheduled-Pax.	49.2	3.9	34.2	0	19.6
	Cargo	42.2	0.3	28.3	0	16.3
	Charter - Pax.	4.1	95.3	34.3	99.2	61.9
	Cargo	4.5	0.5	3.2	0.8	2.2
Pac. Western	Scheduled-Pax.	58.8	8.9	49.4	0	38.1
	Cargo	15.8	0.5	12.9	0	10.0
	Charter - Pax.	5.8	88.2	21.3	57.5	29.6
	Cargo	19.6	2.4	16.4	42.5	22.3
Quebecair	Scheduled-Pax.	62.7	0	50.1	0	24.7
	Cargo	7.6	0	6.1	0	3.0
	Charter - Pax.	9.9	100.0	28.0	100.0	64.5
	Cargo	19.8	0	15.8	0	7.8
Transair	Scheduled-Pax.	76.2	0	60.6	0	47.3
	Cargo	9.6	0	7.6	0	5.9
	Charter - Pax.	5.9	99.9	25.1	99.3	41.5
	Cargo	8.3	0.1	6.7	0.7	5.3
Local Service						
Allegheny	Scheduled-Pax.	n.a.	n.a.[e]	88.9	0	88.9
	Cargo	n.a.	n.a.[e]	8.6	0	8.6
	Charter - Pax.	n.a.	n.a.[e]	2.5	0	2.5
	Cargo	n.a.	n.a.[e]	0	0	0
Frontier	Scheduled-Pax.	n.a.	n.a.[e]	91.1	0	91.1
	Cargo	n.a.	n.a.[e]	8.8	0	8.8
	Charter - Pax.	n.a.	n.a.[e]	0.1	0	0.1
	Cargo	0	0	0	0	0
N. Central	Scheduled-Pax.	n.a.	n.a.[e]	83.9	0	83.9
	Cargo	n.a.	n.a.[e]	9.0	0	9.0
	Charter - Pax.	n.a.	n.a.[e]	7.1	0	7.1
	Cargo	n.a.	n.a.[e]	-	0	-
Southern	Scheduled-Pax.	n.a.	0	n.a.	n.a.[h]	82.7
	Cargo	n.a.	0	n.a.	n.a.[h]	7.0
	Charter - Pax.	n.a.	0	n.a.	n.a.[h]	10.3
	Cargo	0	0	0	0	0

Sources and notes: same as for Table 6

*Abbreviation for passengers

The Canadian regional carriers shared a common difference from the other airlines in that charter traffic played a much more important role in their total operations. The highest charter shares for the other carriers were Air Florida's 9.5 per cent of total system RTM and CP Air's 7.3 per cent, but the lowest charter share for the regional carriers was Eastern Provincial's 23.5 per cent. Transair's charter operations accounted for 46.8 per cent of total RTM, Pacific Western carried 51.9 per cent charter, while Nordair had a 64.1 per cent charter share and Quebecair's charter RTM was 72.3 per cent of total system RTM! In terms of RTM carried, these last two carriers might better be characterized as charter airlines performing modest scheduled services. In terms of other measures (such as aircraft hours flown, number of departures, revenues, etc.), this characterization would be less accurate because the RTM measure is influenced by the long-hauls and high load factors of charter operations. But, even after allowing for that, charter service would still be very important for these two carriers. Overall, in relation to the other airlines being studied, the charter traffic of the five regional carriers can be termed big (Eastern Provincial), bigger (Transair and Pacific Western) and biggest (Nordair and Quebecair).

An inverse, but related, progression also existed with regard to area of operation. Table 6 shows that Eastern Provincial had the largest domestic traffic share (77.3 per cent), Transair was next (62.1 per cent), Pacific Western was third (62.6 per cent), while Quebecair and Nordair both had relatively small domestic traffic shares (39.2 and 38.4 per cent, respectively). Since the scheduled operations of the regional carriers were either solely or mainly domestic, it follows that Eastern Provincial would have the largest scheduled traffic shares (98.3 per cent domestically and 76.5 per cent systemwide), Transair would be next (85.8 per cent and 53.2 per cent), followed by Pacific Western (74.6 per cent and 48.1 per cent), and Quebecair (70.3 per cent and 27.7 per cent). All four of these carriers emphasized passenger service in their scheduled operations (58.8 to 84.7 per cent). Nordair was somewhat different. Most of its small domestic RTM share (38.4 per cent of total) was scheduled (91.4 per cent), but only 49.2 per cent of domestic RTM was scheduled passenger. An unusually large 42.2 per cent was scheduled cargo.

Complementary to the above is the conclusion that those regional carriers with large charter operations also had large transborder and international traffic shares. Indeed, Nordair and Quebecair had 61.6 and 60.7 per cent, respectively, of their total RTM destined to or originating from non-Canadian points. Pacific Western had 43.3 per cent and Transair had 37.9 per cent of their total RTM flying transborder or internationally. The smallest, Eastern Provincial, had essentially no international traffic and only 22.7 per cent in transborder services (including St. Pierre and Miquelon).

Summary

Table 7 shows that there was a wide range in the traffic mix carried by the five airline groups. At one extreme were the specialized intrastate carriers with mainly domestic scheduled passenger traffic. Ranging down from this group were the U.S. local service carriers with major, but somewhat less, emphasis on domestic scheduled passenger traffic. This group was followed by the Canadian mainline and the U.S. trunk carriers with around three-quarters of their total RTM being scheduled passenger service (but ranging from 63.6 per cent for Northwest to 86.4 per cent for Delta). Finally, at the other extreme, were the Canadian regional carriers -- all with important transborder and/or international charter services which, in two cases, accounted for over 60 per cent of total system RTM.

Table 6 indicates that the regional carriers were not unique in their emphasis on transborder and international traffic. The non-domestic RTM of Air Canada and CP Air accounted for a surprising 50 per cent or more of total system RTM in contrast to the U.S. carriers' emphasis on domestic traffic.

Among the Canadian carriers, Air Canada was by far the largest, but, generally speaking, the Canadian carriers were smaller than their closest U.S. counterparts. Even Air Canada was not unusually large by North American standards. At the same time, however, the Canadian regional carriers were not unlike the U.S. intrastate carriers in terms of total RTM produced.

One important implication of the large range of carrier sizes is that size alone does not determine market power in individual routes or city pairs. PSA entered major California city pairs despite the opposition of United, Western and other carriers, as did Air California, which faced the additional opposition of the by then well-established PSA. Southwest has been very successful against the parallel services of Braniff and Texas International, and Air Florida has survived the rivalry of Eastern and National. In each case, the new intrastate carrier was minuscule compared with its established rivals; yet it managed to attract customers and grow throughout the period studied (and on to the present).

Footnotes

1. There were eleven U.S. trunk carriers during 1975-78.

2. This was calculated from the RTM data in Appendix E. The percentage distribution for 1978 alone was 46.3 per cent domestic, 15.4 per cent transborder and 38.3 per cent international.

3. This quotation is from a conversation with Mr. Lowell McCallister, Manager -- Procedures & Publications, Southwest Airlines on August 17, 1979.

Chapter V

AIRLINE REVENUES

Chapter IV demonstrated that large differences existed among the airlines in terms of physical size and geographic distribution of operations, as measured by RTM. Similar comparisons using revenues would provide economic measures of these two factors. Furthermore, by combining these physical and economic measures to obtain average revenues per RTM (yields), the carriers can also be compared to determine if yields differ systematically by type of traffic (passenger, cargo and charter) or by area of operation. These analyses will be undertaken in this chapter and, in the process, some tentative evidence regarding cross-subsidization and economies of scale will be presented.

Relative Sizes

Revenue data for the various traffic categories by major area of operation are presented in Appendix F for each carrier for the years 1975-78. Using these data, Table 8 shows the relative sizes of total system traffic revenues of the carriers (earned from passenger, cargo and charter services), again using Air Canada as the base carrier with an index number of 100. By comparing the first column in Table 6 with the first column in Table 8, it can be seen that the index numbers of CP Air, Trans World and Northwest are smaller when measured in dollars of revenues rather than in ton-miles of traffic. In contrast, Delta's revenue index numbers are about the same for both measures, the Canadian regional carriers' (except Nordair's) revenue index numbers are somewhat higher, and those of the U.S. local service carriers are appreciably higher than their RTM index numbers. Overall, this means that CP Air, Trans World and Northwest are somewhat smaller in economic terms than they are in physical terms relative to Air Canada. Similarly, the Canadian regional and U.S. local service carriers are somewhat more important, economically speaking.

Those unfamiliar with the airline industry might also conclude from the index numbers that a carrier having a traffic revenue index number lower than its index number calculated from RTM data has a lower fare level and structure than that of Air Canada (and vice versa for higher index numbers). While this could well be the case, the following two factors could also yield relatively high or low index numbers based on traffic revenues:

1. Average trip length (RPM divided by the number of passengers) can affect average fares and rates. Due to the distance taper in airline fares and rates, a carrier having a short average trip length will have higher average fares per mile than a carrier having an appreciably longer average trip length, even though both use the identical fare formula.

Table 8

Relative Sizes and Geographic Distribution of Operations
Canadian Mainline, Regional and Selected U.S. Carriers
Based on Traffic Revenues Aggregated for 1975-78[a]

Carrier	Relative Sizes Sys. Traffic Rev. Air Canada = 100	Geographic Distribution Per Cent of Total System Traffic Revenues			
		Domestic	Transborder	N. America	Int'l.
Mainline					
Air Canada	100.0	59.3%	16.1%	75.4%	24.6%
CP Air	33.8	42.0	12.5	54.5	45.5
Trunk					
Trans World	184.3 - 194.4[e]	67.7	0	67.7	32.3
Northwest[b]	89.0 - 91.0[e]	n.a.	n.a.[f]	72.9	27.1
Delta	159.9 - 168.6[e]	n.a.	n.a.[f]	97.5	2.5
Intrastate					
Air Calif.[c]	4.9 - 5.4[e]	100.0	0	100.0	0
Air Florida[d]	1.2 - 1.4[e]	92.5	0	92.5	7.5
PSA	14.6 - 15.5[e]	100.00	0	100.0	0
Southwest	4.1 - 4.4[e]	100.00	0	100.0	0
Regional					
East. Prov.	3.6	89.6	10.3	99.9	0.1
Nordair	4.5	59.3	14.5	73.8	26.2
Pac. Western	10.4	79.7	9.9	89.6	10.4
Quebecair	5.1	67.4	5.1	72.5	27.5
Transair	3.2	80.2	8.5	88.7	11.3
Local Service					
Allegheny	41.4 - 43.7[e]	n.a.	n.a.[e]	100.0	0
Frontier	18.6 - 19.7[e]	n.a.	n.a.[e]	100.0	0
N. Central	18.5 - 19.5[e]	n.a.	n.a.[e]	100.0	0
Southern	12.8 - 13.5[e]	n.a.	0	n.a.	n.a.

Sources: Appendix F; Finance Canada, April 1979, p. 217

[a]These are four-year totals, except where noted. Traffic revenues include scheduled passenger, scheduled cargo and charter revenues.

[b]1975-77. 1978 data are excluded due to Northwest's 108-day pilot strike.

[c]1977-78

[d]Year ended July 31, 1978 for Air Florida. The average of calendar years 1977 and 1978 for Air Canada

[e]The range of index numbers for U.S. carriers results from using Air Canada's revenues unadjusted (low values) and adjusted (high values) for the exchange rate (see Appendix B).

[f]See note e to Table 6. Transborder revenues are reported as domestic by U.S. carriers.

2. Different mixes of traffic categories will affect average rates per ton-mile. The ton-mile rates for scheduled passenger service are customarily higher than for scheduled cargo and charter services. Therefore, operations emphasizing passenger service should have higher overall rates per ton-mile than operations placing more emphasis on cargo and charter services.

Because of these other factors, one cannot draw definitive conclusions regarding relative fare levels by comparing the differences in index numbers based on RTM and on traffic revenues. For example, since Delta's system passenger trip length was about 636 miles during 1975-78, compared with 1,064 miles for Air Canada's trip length,[1] and 86.4 per cent of its total RTM was generated by scheduled passenger service during this period, compared with 73.9 per cent for Air Canada (Table 7), it is not surprising to find Delta with a higher revenue index number than RTM index number, even though the fare formulas for U.S. trunk and Canadian mainline carriers were very similar during those years. Therefore, given the ambiguities in the yield data, the best comparisons of passenger fare levels and structures are those presented in Chapter I.

Geographic Distributions

A more conclusive comparison between Tables 6 and 8 concerns the differences in geographic distribution based on RTM (from Table 6) and traffic revenues (from Table 8). These tables show that during 1975-78, Air Canada earned 59.3 per cent of its total traffic revenues within Canada while producing only 50.0 per cent of its total RTM domestically (a 9.3 percentage point difference). Similarly, CP Air earned 42.0 per cent of its traffic revenues domestically, but produced just 34.7 per cent of its total RTM in that operating area (a difference of 7.3 percentage points). The differences were even greater for the five regional carriers. Eastern Provincial's domestic traffic revenue share exceeded its RTM share by 12.3 percentage points, Nordair by 20.9, Pacific Western by 17.1, Quebecair by 28.1 and Transair by 18.1.

In contrast to the large differences in distribution for the Canadian carriers, the differences for the U.S. carriers were quite small. Trans World's domestic differential was only 3.7 percentage points on a RTM base of 64.0 per cent. Unfortunately, the domestic/transborder breakdown is not available for Northwest and Delta, but for their North American operations (which were essentially domestic) Northwest's revenue share was 5.6 percentage points higher than its 67.3 per cent RTM share while Delta's revenue share was 0.5 percentage points greater than its very large 97.0 RTM share.

While far from conclusive, the Canadian carriers' larger share of traffic revenues relative to RTM shares in domestic operations, as compared with the U.S. carriers, does provide limited evidence that is consistent with the hypothesis that the international operations of the Canadian carriers are being cross-subsidized by their domestic operations. Of course,

Table 9

Scheduled Passenger Yields per RTM in 1978 and Per Cent Changes over 1975
Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	Yield in Dollars per RTM[a]					Per Cent Change Over 1975				
	Dom.	Trans.	N.Am.	Int'l.	Sys.	Dom.	Trans.	N.Am.	Int'l.	Sys.
Mainline										
Air Canada	1.056	.918	1.022	.679	.921	25.0	10.2	21.2	10.6	17.9
CP Air	.930	.610	.834	.701	.777	24.7	12.5	21.8	13.4	18.1
Trunk										
Trans World	.810	-	.810	.685	.767	12.8	-	12.8	-1.4	7.9
Northwest	n.a.	n.a.	.830	.719	.796	n.a.	n.a.	14.5	16.9	14.5
Delta	n.a.	n.a.	.879	.673	.871	n.a.	n.a.	11.1	-9.3	10.3
Intrastate										
Air California	.779[b]	-	.779[b]	-	.779[b]	23.4[c]	-	23.4[c]	-	23.4
Air Florida	1.075[d]	-	1.075[d]	-	1.075[d]	n.a.	-	n.a.	-	n.a.
PSA	.798	-	.798	-	.798	29.8	-	29.8	-	29.8
Southwest	.740	-	.740	-	.740	1.9	-	1.9	-	1.9
Regional										
East. Provincial	1.334	1.911	1.339	-	1.339	26.7	29.9	26.8	-	26.8
Nordair	1.354	2.821[e]	1.409	-	1.409	23.7	37.6[e]	24.3	-	24.3
Pac. Western	1.559	2.856	1.607	-	1.607	22.4	105.8	25.7	-	25.7
Quebecair	1.606	-	1.606	-	1.606	25.3	-	25.3	-	25.3
Transair	1.253	-	1.253	-	1.253	7.2	-	7.2	-	7.2
Local Service										
Allegheny	n.a.	n.a.	1.230	-	1.230	n.a.	n.a.	17.9	-	17.9
Frontier	n.a.	n.a.	1.057	-	1.057	n.a.	n.a.	8.2	-	8.2
N. Central	n.a.	n.a.	1.452	-	1.452	n.a.	n.a.	11.3	-	11.3
Southern	n.a.	-	n.a.	n.a.	1.192	n.a.	-	n.a.	n.a.	7.8

Sources: Calculated from data in Appendices E and F

[a]Total first-class (where operated), economy/coach and excess baggage revenues divided by total scheduled passenger RTM. Multiplying these figures by 0.1 provides average yields per revenue passenger-mile since each passenger plus baggage is assumed to weigh 200 pounds.

[b]Calculated from scheduled passenger revenues estimated from 1978 total traffic revenues on the basis of Air California's actual revenues by traffic category for the first ten months of 1978

[c]Based on total traffic revenues divided by passenger RTM for both years

[d]Scheduled passenger revenues for the year ended July 31, 1978 divided by scheduled passenger RTM for the year ended June 30, 1978

[e]Scheduled passenger revenues allocated between transborder and domestic routes on the basis of origin and destination (O&D) passenger data and the Hamilton-Pittsburgh yield for 1975

traffic revenue shares relative to RTM shares are also affected by average trip lengths and traffic composition (as discussed above for relative airline sizes), as well as by differences in fare and rate levels. Therefore, better evidence on the existence of cross-subsidization between the three major operating areas could be obtained by comparing traffic revenue shares with shares of operating costs. Since, however, the CTC and the airlines have refused to allow cost information by operating area to be presented in this study, it is not possible to provide that evidence here.

Passenger Yields

So far, this analysis has indicated that differences in average revenues per RTM (yields) do exist among the carriers and among the several types of traffic. By dividing each carrier's revenues by its RTM (Appendices F and E), more explicit comparisons can be made of yields which will provide further insights into the relative performances of the carriers.

Each carrier's scheduled passenger yields for 1978 are presented in Table 9, together with the percentage changes in these yields between 1975 and 1978.[2] Looking at domestic passenger yields in relation to transborder and international yields, it can be seen that the Canadian mainline and the U.S. trunk carriers all have higher yields for their domestic services than for their international services (and for transborder services for the Canadian carriers). Air Canada and CP Air's domestic yields were 55.5 and 32.7 per cent higher than their international yields, while Trans World's domestic yield was only 18.2 per cent higher than its international yield. At the same time, the North American (primarily domestic) yields of Northwest and Delta were 15.4 and 30.6 per cent higher than international.

Of course, the above yields and percentage differences for 1978 were influenced by the higher costs associated with the relatively short average trip lengths for domestic/North American passengers as compared with the longer average trips and lower costs for international passengers. Therefore, more useful comparisons could be made if each carrier's average costs per RTM were also available by major operating area. Unfortunately, since the CTC and the Canadian carriers refused to make such information available for presentation in this study, direct comparisons among carriers of net differences between yields and costs per RTM cannot be made. There is, however, another way to approximate the effects of distance-related costs on yield per RTM through the use of the domestic passenger fare formulas (see Table A.1). Since these formulas are supposed to reflect the cost differences associated with distance, and since the systemwide relationships between distance and total operating expenses per RTM were essentially the same for the Canadian and U.S. federally-regulated airlines (see Figure 4), it follows that the formulas can be used to adjust for the effects of distance on costs in the following manner.

1. Calculate fares per mile for the mainline and trunk carriers from their respective formulas using both the average domestic and the average international scheduled passenger trip lengths

for each carrier. The differences in these fares per mile approximate the cost differences for the two distances.

2. Compare the percentage differences in the calculated domestic and international fares per mile with the percentage differences between the actual domestic and international yields for each carrier (based on the same average mileages in each case).

3. If the percentage differences between the actual domestic and international yields of the Canadian carriers are larger than the differences between their calculated cost-based fares per mile, while the percentage differences for the U.S. carriers' actual yields are smaller than their calculated fare-per-mile differences, then it can be concluded that domestic Canadian yields in 1978 were indeed higher relative to costs than their international yields, while those of the U.S. carriers were lower.

This comparison is carried out in Table 10. It can be seen from the last two columns of this table that the percentage differences for the actual yields for both Air Canada and CP Air were indeed larger than the percentage differences for their calculated fares per mile, while the opposite was true for all three U.S. trunk carriers. Thus, it appears that domestic Canadian yields were significantly higher than their international yields, after adjusting for distance-related cost differences. This provides stronger, but still not conclusive, evidence that international passenger services were being cross-subsidized by the Canadian carriers' domestic passenger services. If cross-subsidization did occur, it was especially large for Air Canada whose 55.5 per cent yield difference was almost twice its 27.9 per cent fare-per-mile (estimated cost) difference.

The above evidence is based on data for 1978 only. Table 9 also shows the percentage increases in yields between 1975 and 1978. These data indicate that if cross-subsidization existed in 1978, it was greater than in 1975. The increases in domestic yields for both Canadian mainline carriers over this period were about 25 per cent, while their transborder yields increased only 10.2 and 12.5 per cent, and their international yields just 10.6 and 13.4 per cent. In contrast, the North American (domestic for Trans World) yields for the three U.S. trunk carriers increased between 11.1 and 14.5 per cent, while the international yield for Trans World's Atlantic service decreased 1.4 per cent and the yield for Northwest's Pacific service increased 16.9 per cent. The extensive rivalry that has developed over the North Atlantic with the introduction of Laker's service in September 1977, and the associated increase in discount fares offered by the established carriers, appears to be reflected in the change in Trans World's yields.[3]

The data in Table 9 for the five Canadian regional carriers show that their 1978 scheduled passenger yields were appreciably higher than those of the mainline carriers. Domestically, their yields ranged from 18.2 to 72.7 per cent higher than the mainline carriers, with most differences

being between 26 and 53 per cent. These higher yields, of course, result from a combination of higher fare formulas for northern services and shorter average trip lengths.[4] In addition, the very small and short-haul transborder operations of three of these carriers had yields 43 to 108 per cent higher than their domestic scheduled passenger yields.

Table 10

Differences in Average Passenger Trip Lengths, Fares per Mile and Yields
Canadian Mainline and U.S. Trunk Carriers, 1978

Carrier	Average Scheduled Pax. Trip Length[a]		Calculated Domestic Formula Fare/Mile[b]		Domestic Per Cent Higher than Int'l.	
	Domestic	Int'l.	Domestic	Int'l.	Calculated Fare/Mile	Actual Yield
Mainline						
Air Canada	841	3,087	11.77¢	9.20¢	27.9%	55.5%
CP Air	980	4,256	11.22	8.94	25.5	32.7
Trunk						
Trans World	1,033	3,506	10.04	7.90	27.1	18.2
Northwest	835[c]	3,015	10.65[c]	8.05	35.3[c]	15.4
Delta	627[c]	1,694	11.81[c]	8.91	32.5[c]	30.6

Sources: Calculated from information presented in Tables 9, A.1, G.1, G.2, H.1 and H.2

[a]Scheduled RPM divided by scheduled passengers (see footnote 1, Chapter III)

[b]Calculated from economy/coach passenger fare formulas for Canadian mainline carriers (effective April 1, 1978) and U.S. trunk carriers (effective May 1, 1978)

[c]North America for Northwest and Delta

With the single exception of Transair, the percentage increases in the regional carriers' domestic yields for 1978 over 1975 ranged from 22.4 to 26.7 per cent -- almost identical to the Air Canada and CP Air increases for the same period. The relatively small 7.2 per cent increase for Transair appears to be due to the fact that its average scheduled passenger trip length increased by 20.2 per cent during this three-year period, while those for the other four regional carriers were virtually unchanged or, in the case of Eastern Provincial, actually decreased by 13 per cent (ibid.).[5]

Turning now to the U.S. intrastate carriers, Table 9 shows that, except for Air Florida, their 1978 North American (domestic) yields did not differ appreciably from those of the trunk lines despite their lower fares per mile. This similarity in yields is due to the large differences in passenger trip lengths. The intrastate carriers' passenger trip lengths for 1978 ranged from 291 to 334 miles, compared with North American trip lengths

for the three trunk carriers of 627 to 1,033 miles. The intrastate carriers might better be compared with the local service carriers which had 1978 trip lengths between 279 and 430 miles.[6] At the extreme, differences in yield of 96.2 per cent (North Central over Southwest) reflect the large differences in fares per mile found in Table 1, even though the relatively more prevalent discount fares of the local service carriers decreased their yields in relation to the intrastate carriers that offered few discount fares.

The other relevant factor about the intrastate carriers is that the two California carriers, Air California and PSA, increased their average yields between 1975 and 1978 at essentially the same rate as the Canadian carriers' domestic yields increased -- that is, around 25 per cent. At the same time, Southwest Airlines had a negligible 1.9 per cent increase in yield, and by 1978 had the lowest domestic yield of all the airlines covered in this study, despite its short trip length.

Cargo Yields

Since cargo is comprised of mail, freight and express, and since these categories have different yields, average cargo yields are affected by the mix of cargo traffic. Table 11 shows the relative shares of total system cargo RTM accounted for by mail, freight and express during 1978. It also gives each carrier's yield per RTM for each category. In 1978, express comprised 4.1 per cent or less of total system cargo RTM, but consistently had the highest yields among the three traffic categories. Freight, on the other hand, accounted for over two-thirds of cargo RTM for each carrier (except for Allegheny's 55.9 per cent). It had the lowest yields of the three traffic categories for the Canadian carriers, but was somewhat above mail yields for the U.S. carriers (except for PSA). Finally, mail RTM ranged from a low of 11.4 per cent of cargo RTM to a high of 42.2 per cent.

The mail yields for the U.S. trunks were roughly half the yields for the Canadian mainline carriers, while the U.S. local service carriers' mail yields were only about one-third to one-half of the Canadian regional carriers' very high yields. Overall, the high Canadian mail yields relative to U.S. mail yields and relative to Canadian freight yields (when U.S. mail yields were lower than U.S. freight yields) implies that the Canadian government may be subsidizing these airlines through above-market mail payments.

Table 12 contains the same information for scheduled cargo as given in Table 9 for scheduled passenger operations. The individual carrier data in these two tables show that, except for CP air, the cargo yields for each mainline and trunk carrier bore a remarkably consistent ratio to its passenger yields for each area of operation. Air Canada's cargo yields for the various operating areas were all about 51 per cent of its passenger yields, Trans World's were around 46 per cent, Northwest's were about 35 per cent and Delta's were around 57 per cent. Therefore, for Air Canada, the evidence from passenger yields regarding the cross-subsidization of international operations by domestic is also supported by the evidence from cargo yields.

Table 11

Mail, Freight and Express Per Cent of Cargo RTM, Plus Yields
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	1978 Total System					
	Per Cent of Cargo RTM			Yield in Dollars per RTM		
	Mail	Freight	Express	Mail	Freight	Express
Mainline						
Air Canada	15.0%	80.9%	4.1%	.531	.346	1.843
CP Air	20.8	77.4	1.8	.572	.380	1.107
Trunk						
Trans World	25.5	74.3	0.2	.305	.357	2.048
Northwest	20.0	79.7	0.3	.250	.282	.635
Delta	29.1	67.6	3.3	.335	.551	.794
Intrastate						
Air Calif.	0	100.0	0	-	1.360[a]	-
Air Florida	0	100.0	0	-	1.280[a]	-
PSA	12.2	87.8	0	1.556	.924	-
Southwest	0	100.0	0	-	3.380[a]	-
Regional						
East. Prov.	26.6	73.3	0.1	1.858	.926	145.606[b]
Nordair	12.2	87.8	0	1.368	.734	-
Pac. Western	11.4	88.6	0	1.424	.814	-
Quebecair	17.5	82.5	0	2.131	1.264	-
Transair	11.9	84.9	3.2	2.492	1.090	3.658
Local Service						
Allegheny	42.2	55.9	1.9	.656	1.285	1.711
Frontier	30.7	68.0	1.3	.532	.949	1.185
N. Central	31.2	67.9	0.9	.769	1.606	2.812
Southern	25.1	73.7	1.2	.654	1.070	1.800

Sources: Calculated from data in SC(ASC) (o) "1978"; CAB (c), Dec. 1978; Table E.3 and Appendix F

[a]Calculated using estimated data. Therefore, this figure may be inaccurate.

[b]This unusually large yield has been verified with more detailed route data.

Table 12

Scheduled Cargo Yields per RTM in 1978 and Per Cent Changes Over 1975
Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	Yield in Dollars per Cargo RTM[a]					Per Cent Change Over 1975				
	Dom.	Trans.	N.Am.	Int'l.	Sys.	Dom.	Trans.	N.Am.	Int'l.	Sys.
Mainline										
Air Canada	.532	.477	.521	.337	.436	18.2	21.7	18.4	10.9	14.4
CP Air	.431	.327	.415	.447	.433	42.7	26.7	40.7	17.6	25.1
Trunk										
Trans World	.372	-	.372	.314	.347	33.3	-	33.3	8.7	22.6
Northwest	n.a.	n.a.	.304	.246	.277	n.a.	n.a.	31.0	9.8	21.0
Delta	n.a.	n.a.	.500	.371	.496	n.a.	n.a.	31.9	6.0	31.2
Intrastate										
Air Calif.	1.360[b]	-	1.360[b]	-	1.360[b]	n.a.	-	n.a.	-	n.a.
Air Florida	1.280[b]	-	1.280[b]	-	1.280[b]	n.a.	-	n.a.	-	n.a.
PSA	1.001	-	1.001	-	1.001	17.5	-	17.5	-	17.5
Southwest	3.380[b]	-	3.380[b]	-	3.380[b]	-1.9[b]	-	-1.9[b]	-	-1.9[b]
Regional										
East. Prov.	1.238	-	1.238	-	1.238	19.6	-	19.6	-	19.6
Nordair	.806	2.461[c]	.811	-	.811	17.3	49.6[c]	17.5	-	17.5
Pac. Western	.865	3.306	.883	-	.883	41.6	75.3	42.0	-	42.0
Quebecair	1.416	-	1.416	-	1.416	-9.2	-	-9.2	-	-9.2
Transair	1.340	-	1.340	-	1.340	17.0	-	17.0	-	17.0
Local Service										
Allegheny	n.a.	n.a.	1.028	-	1.028	n.a.	n.a.	53.4	-	53.4
Frontier	n.a.	n.a.	.824	-	.824	n.a.	n.a.	44.3	-	44.3
N. Central	n.a.	n.a.	1.355	-	1.355	n.a.	n.a.	50.7	-	50.7
Southern	n.a.	-	n.a.	n.a.	.975	n.a.	-	n.a.	n.a.	33.7

Sources: Calculated from data in Appendices E and F

[a]Total mail, freight and express revenues divided by total scheduled mail, freight and express RTM

[b]Calculated using estimated RTM. Therefore, this figure may be inaccurate.

[c]Scheduled cargo revenues allocated between transborder and domestic routes on the basis of O&D passenger data and the Hamilton-Pittsburgh yield for 1975. Therefore, this figure may be inaccurate.

The CP Air exception deserves further consideration. During 1978, its cargo yield was 46 per cent of passenger yield domestically, 54 per cent for transborder service and 64 per cent internationally. As a result, while its domestic passenger yield was 32.7 per cent above its international passenger yield (compared with 55.5 per cent for Air Canada and 15.4 to 30.6 per cent for the three U.S. trunk carriers), its domestic cargo yield was 3.6 per cent below its international cargo yield. A more detailed investigation of yields for mail and freight shows consistently lower domestic yields than international yields for both categories (express being operated only domestically), so that the CP Air "anomally" was not due to one traffic category. Thus, significant differences existed in CP Air's domestic as opposed to its international pricing practices. Passenger yields were high (relative to cargo) domestically, and low internationally. It follows that, to this point, the evidence for cross-subsidization by area of operation rests solely on passenger yields for CP Air, while both passenger and cargo yields support the hypothesis with regard to Air Canada.

In contrast to the differences in yields between the Canadian mainline and the U.S. trunk carriers, the cargo and freight yields of the regional and local service carriers were roughly similar, with both groups having variable and high yields compared with the larger carriers. North Central, Allegheny and Quebecair had the highest freight yields, while Nordair, Pacific Western and Eastern Provincial had the lowest (Table 11). Similarly, North Central, Quebecair and Transair held the honours for high cargo yields, while Nordair, Pacific Western and Frontier had the lowest (Table 12). PSA's yield pattern and level were similar to that of the Canadian regional carriers, but its very small cargo operation made this source of revenue quite unimportant. Indeed, the lack of accurate cargo data for the intrastate carriers not only makes it questionable to rely upon their cargo yield data, but testifies to their limited interest in cargo operations. Much of their freight service has consisted of small pacakges handled at their passenger ticket counters, and PSA's mail service has been limited to a single late-evening round trip between Sacramento, Los Angeles and San Diego (CAB Order No. 77-11-11, Nov. 3, 1977).

As a final matter, it should be noted that the domestic/North American cargo yields of the U.S. trunk and local service carriers generally increased from 31 to 53 per cent between 1975 and 1978. This is more than all but two of the Canadian carriers (CP Air and Pacific Western); yet the U.S. carriers' 1978 domestic cargo yields were still roughly equal to or less than the comparable Canadian carriers. In contrast, the international cargo yields of the U.S. trunk carriers increased somewhat less than those of the Canadian mainline carriers, with the increases in this area of operation consistently being less than in North America for all carriers.

In summary, cargo yields were well below passenger yields,[7] with the large increases in U.S. domestic yields from 1975 to 1978 bringing them up to or somewhat below Canadian yields. Also, further evidence was provided regarding possible cross-subsidization by Air Canada of international by do-

mestic operations, and there was an indication of above-market mail payments to Canadian carriers.

Charter Yields

The final major source of traffic revenues is charter operations. Since passenger and cargo charter revenues are not reported separately by the Canadian carriers, these two traffic categories must be combined when calculating yields. However, as shown in Appendix E, during 1978 passenger RTM comprised 86.6 per cent of total charter traffic for the carriers being studied. Indeed, CP Air, Delta, Eastern Provincial, the intrastate carriers and the local service carriers had no cargo charters in that year. Therefore, charter yields reflect mainly passenger operation. In addition, since the total charter operations of the intrastate carriers and Frontier were so small between 1975 and 1978 (Tables E.3 and E.5), these carriers will be excluded from the following discussion.[8]

Table 13 contains the same yield and percentage change information for charter operations that was given in Table 9 for scheduled passengers and in Table 12 for scheduled cargo operations. Calculations using the data in Tables 9 and 13 show that the 1978 system charter yields for the federally-regulated airlines were between 44 and 69 per cent lower than the system scheduled passenger yields. In addition, except for Delta's North American operations, charter yields were consistently somewhat higher than the scheduled cargo yields for the mainline and trunk carriers. At the same time, except for Nordair domestic, charter yields were consistently below the relatively high scheduled cargo yields for the Canadian regional and U.S. local service carriers.

Perhaps the most distinctive characteristic of the 1978 charter yields was their high degree of homogeneity. All the Canadian carriers' transborder and international yields for 1978 were between 41.9 and 52.2 cents per RTM (roughly 4.2 and 5.2 cents per RPM), with nine out of 13 yields lying within the narrow range from 43 to 47 cents per RTM, and with Air Canada and CP Air having the highest transborder yields. Most domestic yields were higher than transborder yields, but domestic charters accounted for only 15.2 per cent of total Canadian charter RTM in 1978.[9] On a system-wide basis, the homogeneity was even greater -- falling within a range of 43.4 to 50.1 cents per RTM, except for Quebecair's 60.5-cent yield resulting from its unusually high domestic yield in 1978 (and 1977). A somewhat lesser degree of homogeneity existed among the U.S. carriers, with their North American yields ranging from 42.8 to 53.7 cents per RTM, international yields of 37.6 to 50.3 cents, and system yields of 41.3 to 53.7 cents per RTM, except for Southern's 69.1-cent yield (and excluding the intrastate carriers and Frontier).

The high degree of homogeneity in Canadian transborder and international yields could be due to cooperation between the carriers or to active competition. Two pieces of evidence imply, however, that competition was the major reason. First, these yields were low relative to those for sched-

Table 13

Charter Yields per RTM in 1978 and Per Cent Changes Over 1975
Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	Yield in Dollars per Charter RTM[a]					Per Cent Change Over 1975				
	Dom.	Trans.	N.Am.	Int'l.	Sys.	Dom.	Trans.	N.Am.	Int'l.	Sys.
Mainline										
Air Canada	.632	.522	.534	.452	.468	2.4	-41.7	-32.2	20.2	21.6
CP Air	.440	.521	.477	.430	.434	-25.7	12.3	-5.2	-2.7	-3.1
Trunk										
Trans World	.428	-	.428	.414	.417	7.3	-	7.3	20.7	15.5
Northwest	n.a.	n.a.	.437	.376	.413	n.a.	n.a.	-13.1	3.9	6.2
Delta	n.a.	n.a.	.469	.503	.474	-	-	-40.3	-39.8	-40.2
Intrastate										
Air Calif.	.780[b]	-	.780[b]	-	.780[b]	n.a.	-	n.a.	-	n.a.
Air Florida	n.a.	-	n.a.	n.a.	.750[b]	n.a.	-	n.a.	n.a.	n.a.
PSA	.800[b]	-	.800[b]	-	.800[b]	n.a.	-	n.a.	-	n.a.
Southwest	1.180[b]	-	1.180[b]	-	1.180[b]	62.8[b]	-	62.8[b]	-	62.8[b]
Regional										
East. Prov.	.564	.491	.501	-	.501	-30.5	9.4	10.1	-	10.1
Nordair	1.114	.455	.568	.437	.481	-18.3	10.7	-6.9	4.5	1.4
Pac. Western	.575	.430	.512	.472	.497	-15.1[c]	2.9	-12.6[c]	69.8[c]	19.2
Quebecair	1.268[c]	.419	.941[c]	.438	.605	286.6[c]	4.8	153.6[c]	10.6	55.5
Transair	.429	.457	.447	.453	.449	-16.2	-16.0	-15.7	-16.9	-16.5
Local Service										
Allegheny	n.a.	n.a.	.537	-	.537	n.a.	n.a.	8.9	-	8.9
Frontier	n.a.	n.a.	.382	-	.382	n.a.	n.a.	-29.9	-	-29.9
N. Central	n.a.	n.a.	.467	-	.467	n.a.	n.a.	-30.1	-	-30.1
Southern	n.a.	-	n.a.	n.a.	.691	n.a.	-	n.a.	n.a.	12.0

Sources: Calculated from data in Appendices E and F; SC(ASC) (h) "1978"

[a]Total charter revenues divided by total charter RTM (passenger plus cargo)

[b]Calculated using estimated RTM. Therefore, this figure may be inaccurate.

[c]Domestic charter RTM and yields increased sharply in 1977-78 over 1975-76 due to the inauguration of a major Convair-580 operation (no aircraft miles in 1975, 1,996,051 in 1978). This may have been associated with the James Bay project.

uled passenger service -- 44 to 49 per cent below system scheduled passenger yields for the mainline carriers and 62 to 69 per cent lower for the regionals (Tables 9 and 13). Effective carrier cooperation would tend to narrow the differences between these two types of service by raising the charter yields. Second, and more persuasive, the Canadian yields were very similar to the charter yields of the U.S. carriers whose charter services were relatively free of regulation and were conducted in competition with the supplemental carriers.

In order to verify this second statement, the U.S. yields should be adjusted for possible exchange rate effects because these are small (rather than large) differences. Consistent with the analysis in Appendix B, an average rate of 1.0705 was used to make the exchange rate adjustments -- that is, the midpoint between the largest conceivable adjustment (using the 1978 exchange rate of 1.141) and no adjustment (Finance Canada, April 1979, p. 217).[10] Table 14 gives the Canadian and U.S. charter yields expressed in Canadian dollars. In addition, the average charter flight stage lengths (aircraft miles divided by departures) are given to indicate the similarities and differences in the distance factor.

Charter yields in Canadian dollars are plotted against stage lengths on Figure 5 for the North American data, Figure 6 for international and Figure 7 for total system data. In addition, a trend line is fitted in each figure. Figure 5 shows that, with the exception of Quebecair (and Frontier), the Canadian and U.S. carriers are grouped fairly closely around the North American trend line, with the airlines of both countries lying above and below the line. The same is true for the international data in Figure 6, with only Delta being appreciably above the trend line, perhaps due in part to its international charter operations being limited to the Caribbean area. A similar conclusion applies to the total system data except that, here, three carriers lie appreciably above the trend line: Quebecair (due to its domestic short-haul Convair-580 operation), plus Allegheny and Southern (for whom only total system data are available). In this case, not only are the majority of Canadian and U.S. carriers grouped around the trend line, but the three large deviations are also comprised of carriers from both countries.

Overall, these figures support the conclusion that the charter yields of the Canadian and U.S. carriers are similar and, therefore, they provide evidence that competition was the cause of the similarities in Canadian charter yields. However, to ensure that this evidence is not considered to be conclusive, and to point out that these are not the lowest feasible charter yields, it will be mentioned that during 1978 the four U.S. supplemental carriers having extensive international operations (Capitol International, Overseas National, Trans International and World Airways) had total system yields of 37.5, 33.3, 34.9 and 37.3 cents per RTM, respectively.[11] Thus, while the yields of the scheduled airlines were low and generally similar, those of the U.S. charter specialists were also similar among themselves, and were equal to or lower than the lowest charter yield of the U.S. trunk carriers (Northwest's international yield of 37.6 cents per RTM).

Table 14

Charter Yields per RTM in Canadian Dollars, and Average Stage Lengths
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	Yield per RTM in Canadian Dollars[a]					Average Flight Stage Length[b]				
	Dom.	Trans.	N.Am.	Int'l.	Sys.	Dom.	Trans.	N.Am.	Int'l.	Sys.
Mainline										
Air Canada	.632	.522	.534	.452	.468	767	1,154	1,098	2,051	1,637
CP Air	.440	.521	.477	.430	.434	1,535	1,281	1,384	2,645	2,432
Trunk[a]										
Trans World	.458	-	.458	.443	.446	1,430	-	1,430	2,522	2,178
Northwest	n.a.	n.a.	.468	.403	.442	n.a.	n.a.	1,520	2,269	1,736
Delta	n.a.	n.a.	.502	.538	.507	n.a.	n.a.	1,140	1,172	1,131
Intrastate[a]										
Air Calif.	.835[c]	-	.835[c]	-	.835[c]	n.a.	-	n.a.	-	n.a.
Air Florida	n.a.	-	n.a.	n.a.	.803[c]	n.a.	-	n.a.	n.a.	n.a.
PSA	.856[c]	-	.856[c]	-	.856[c]	n.a.	-	n.a.	-	n.a.
Southwest	1.263[c]	-	1.263[c]	-	1.263[c]	n.a.	-	n.a.	-	n.a.
Regional										
East. Prov.	.564	.491	.501	-	.501	712	1,289	1,142	-	1,142
Nordair	1.114	.455	.568	.437	.481	232	1,150	483	1,371	737
Pac. Western	.575	.430	.512	.472	.497	333	1,299	476	1,715	640
Quebecair	1.268	.419	.941	.438	.605	226	1,170	275	1,776	457
Transair	.429	.457	.447	.453	.449	739	1,129	936	1,580	1,075
Local Service										
Allegheny	n.a.	n.a.	.574	-	.574	n.a.	n.a.	693	-	693
Frontier	n.a.	n.a.	.409	-	.409	n.a.	n.a.	472	-	472
N. Central	n.a.	n.a.	.500	-	.500	n.a.	n.a.	695	-	695
Southern	n.a.	-	n.a.	n.a.	.740	n.a.	-	n.a.	n.a.	569

Sources: Calculated from data in Table 13 and in CAB (c), Dec. 1978; SC(ASC) (h) "1978"

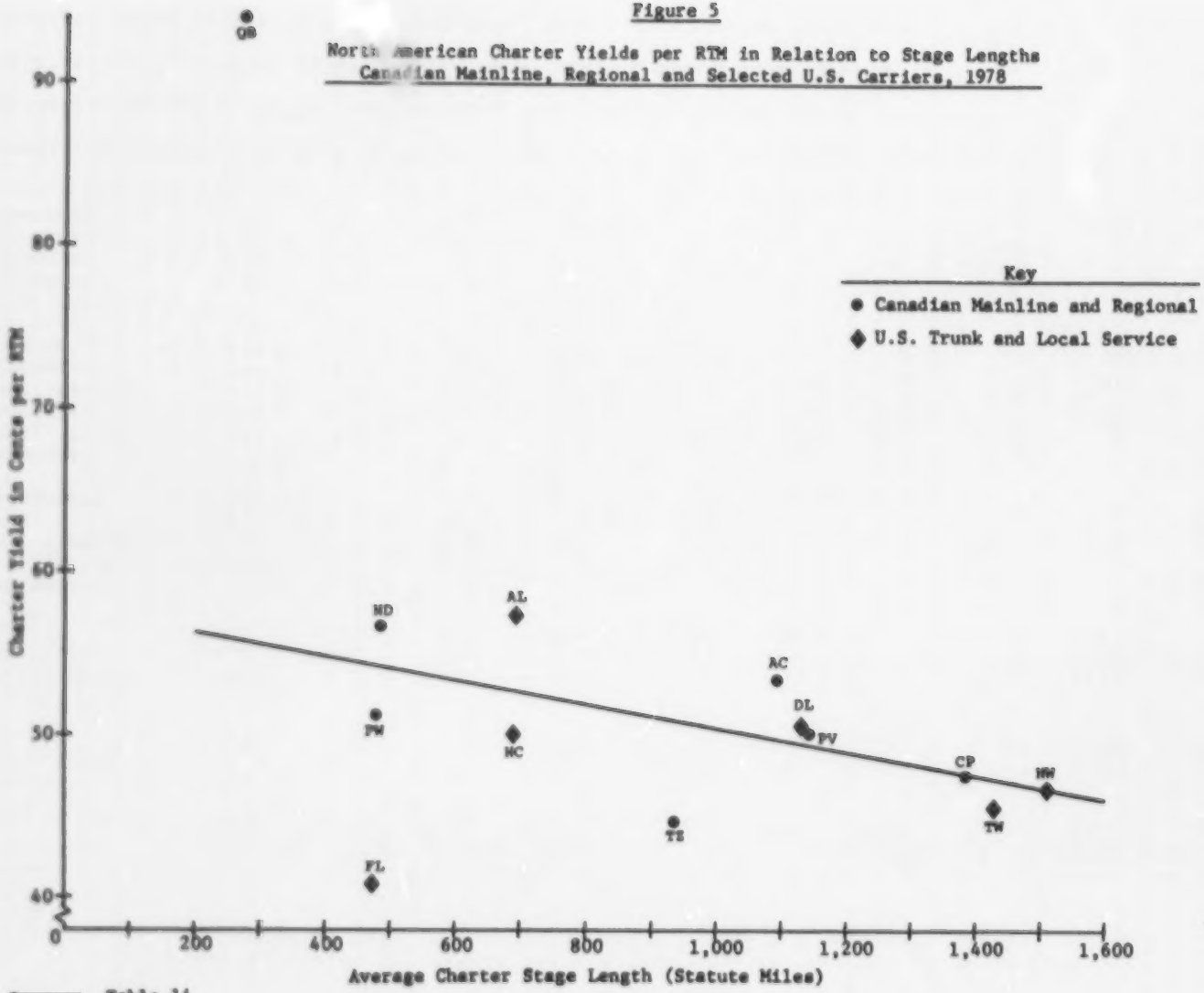
[a]U.S. dollar yields x 1.0705 (see footnote 10), Canadian dollar yields unchanged

[b]Charter aircraft revenue miles divided by aircraft revenue departures

[c]Calculated using estimated RTM. Therefore, this figure may be inaccurate.

Figure 5

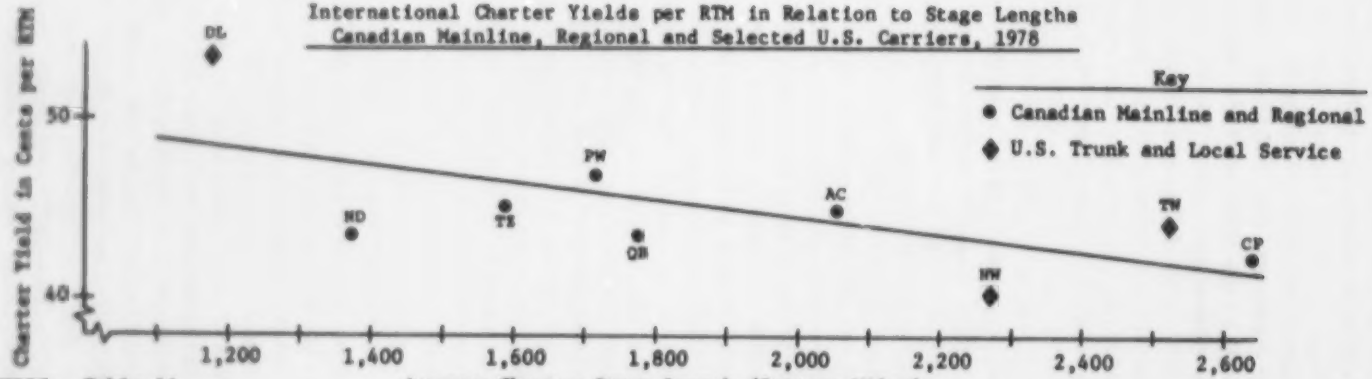
North American Charter Yields per RTM in Relation to Stage Lengths
Canadian Mainline, Regional and Selected U.S. Carriers, 1978



Source: Table 14

Figure 6

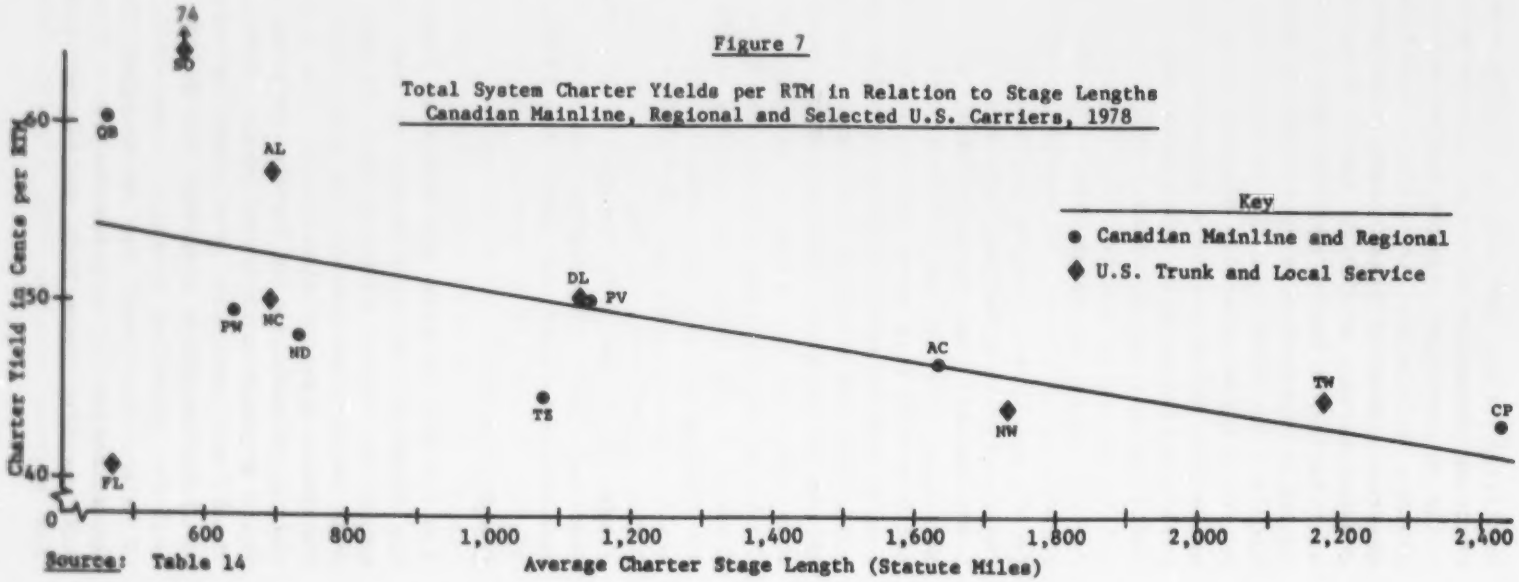
International Charter Yields per RTM in Relation to Stage Lengths
Canadian Mainline, Regional and Selected U.S. Carriers, 1978



Source: Table 14

Figure 7

Total System Charter Yields per RTM in Relation to Stage Lengths
Canadian Mainline, Regional and Selected U.S. Carriers, 1978



Source: Table 14

A final implication that can be drawn from the charter yield data concerns economies of scale. Since the mainline and regional carriers continue to undertake charter operations voluntarily (in contrast to their regulatory obligations to operate scheduled service), it follows that their charter yields at least cover their direct operating costs. Indeed, since charter service accounted for 23.5 to 72.3 per cent of the regional carriers' total RTM during 1975-78 (see Table 7), and since four out of the five regional carriers were profitable in 1978 [only Quebecair had a small after-tax loss in 1978, but not in 1977 (see Appendix C)], it seems likely that charter yields generally covered these carriers' total direct plus indirect operating costs. Therefore, the transborder and international charter yields can be used as maximum estimates of the regional carriers' operating costs for charter services.

Table 14 shows that the Canadian regional carriers' transborder yields for 1978 were, on average, about 13 per cent lower than those of Air Canada and CP Air (simple averages of 45.0 versus 52.2 cents per RTM), while their stage lengths were very similar (all lying within a range of 1,129 to 1,299 miles). At the same time, the simple averages of the international charter yields for the regional and mainline carriers were almost identical (45.0 versus 44.1 cents per RTM), even though the two mainline carriers had longer average stage lengths of 2,051 and 2,645 miles compared with 1,371 to 1,776 for the regional carriers. It follows that, after allowing for the effects of distance, either the regional carriers' costs were somewhat lower than those of the mainline carriers for very similar charter services, or the mainline carriers enjoyed above-normal profits on their charter operations. If the latter is correct, it implies that the operating costs of the two carrier groups were roughly equal and, therefore, that the relatively small regional carriers have achieved full economies of scale.[12] If the former is correct, it implies that the mainline carriers are experiencing slight diseconomies of scale. In either case, the evidence supports the conclusion that the regional carriers are large enough to achieve the full economies of scale available from firm size.

Summary

This chapter has compared revenue shares and average yields among the Canadian and U.S. carriers, both by area of operation and by traffic category. Among other things, it was found that domestic revenue shares were larger than transborder and international shares relative to RTM shares for these areas of operation. This provided the first tentative indication that Air Canada and CP Air may be using domestic revenues to cross-subsidize their international operations. Additional evidence to support this hypothesis was subsequently obtained by comparing passenger yields in each area of operation after adjusting for distance. Cargo yields provided still more evidence regarding possible cross-subsidization for Air Canada, but not for CP Air. It must be appreciated that the evidence regarding cross-subsidization is not conclusive. Direct comparisons among Canadian and U.S. carriers using both revenue and cost data would provide better evidence

on this matter but, unfortunately, the refusal of the CTC and the airlines to allow available cost data (summarized by area of operation) to be presented in this study necessarily precluded such analysis.

Passenger yields were consistently higher than scheduled cargo and charter yields. Furthermore, the expected higher yields of the short-haul Canadian regional and U.S. local service carriers over those of the mainline and trunk carriers were also identified. Similarities between the intrastate carriers' passenger yields and those of the U.S. trunk carriers were explained by the very short hauls of the intrastate carriers relative to the longer hauls of the trunk carriers. With distance held constant, the intrastate carriers' yields were must lower than those of the federally-regulated carriers despite the more extensive use of promotional/discount fares by the trunk and local service carriers. This was demonstrated by comparing intrastate carrier yields with those of the local service carriers which also had short trip lengths.

The high Canadian mail yields relative to freight yields, compared with the U.S. experience, implied that the Canadian government may be subsidizing Canadian airlines by paying above-market rates for mail service. Finally, a comparison of yields for comparable transborder and international charter services indicated that the relatively small Canadian regional carriers are large enough to achieve the full economies of scale available from firm size. Indeed, the evidence implied that the mainline carriers may be experiencing some diseconomies of scale.

Footnotes

1. See Table 6 and footnote 1, Chapter III.

2. These average passenger yields are calculated from aggregated revenue data including first-class and economy/coach passengers, full and discount fares, and excess baggage. Therefore, they are not fares per mile actually paid by individual passengers. Also, changes in the mix of first-class and economy/coach service or in the number or terms of discount fares will change the average yield even though the basic fare formula is unchanged. In 1978, first-class passengers accounted for only 4.9 and 4.6 per cent of Air Canada and CP Air's total system passenger revenues, while excess baggage accounted for 0.2 per cent of both carriers' passenger revenues. For the three U.S. trunk carriers, the first-class share ranged from 9.8 (Northwest) to 11.6 (Trans World) per cent of total system passenger revenues, with excess baggage accounting for between 0.1 and 0.3 per cent. Thus, average yields are primarily determined by economy/coach service and revenues, with first-class playing a more important role in the United States than in Canada. (Percentages calculated from data in Appendix F.)

3. Aviation Week and Space Technology, Oct. 3, 1977, p. 28 and Oct. 17, 1977, p. 27. Delta's 9.3 per cent decrease in yield over this period is excluded here because it reflects the inauguration of transatlantic service on April 30, 1978. Prior to that date, Delta's international service was limited to the Caribbean area.

4. In 1978, the average system scheduled passenger trip lengths of these five carriers ranged for 228 miles (Pacific Western) to 529 miles (Transair). Calculated from data in SC(ASC) (b), Oct.-Dec. 1978, Table 4.

5. Also see SC(ASC) (b), Oct.-Dec. 1975, Table 4.

6. Calculated from data presented in Appendices G and H. Also see CAB (c), Dec. 1978.

7. This is due both to the higher yields earned for passenger service and to the fact that the aircraft facilities required to carry passengers (seats, carpets, overhead racks, galleys, lavatories, flight attendants, etc.) weigh more than the facilities required to carry freight, but are not reflected in the 200 pounds per passenger weight allowance used in calculating RTM for RPM.

8. The interested reader will find the data for these carriers in the various tables and appendices should he wish to include these carriers in the comparisons. As indicated, however, the intrastate carriers' RTM and yield data are estimated and may be inaccurate. The limited charter operations of these carriers are consistent with their low fares for scheduled passenger service since demand for charter services will be decreased when the price of scheduled service (a substitute good) is low.

9. This was calculated from data given in Appendix E. Note that Pacific Western and Quebecair accounted for 73.6 per cent of all domestic charter RTM (11.2 of the 15.2 percentage points).

10. The 1.0705 rate also serves to minimize possible error due to using an inappropriate exchange rate. The problem of selecting the proper exchange rate would not arise if the comparison were between the price to Canadians of goods imported from the United States (including a winter holiday in Florida) and the price to Americans of those identical goods. In that case, using the official exchange rate would be appropriate. Here, however, the comparison is between domestic yields paid by Canadians for charter services produced by Canadian carriers and domestic yields paid by Americans for charter services produced by U.S. carriers. It is in this comparison of domestic prices for domestically produced goods such as air transportation that the use of the official exchange rate is probably inappropriate.

11. These yields were calculated from data in CAB (b), Dec. 1978 and (c), Dec. 1978.

12. It could also imply that the mainline carriers' operating costs for charter service were somewhat lower than those of the regional carriers, but that would imply, in turn, that their charter profits were very large indeed. This, of course, would be inconsistent with the above evidence that charter yields result more from carrier competition than from carrier cooperation.

Chapter VI

LABOUR PRODUCTIVITY

Labour comprises the largest single share of total airline expenses. Table 15 shows that total labour expenses (salaries, wages and benefits) ranged from 31.0 to 47.6 per cent of total operating expenses in 1975, and from 25.3 to 46.7 per cent in 1978, with most of the shares exceeding 35 per cent in both years. As discussed in Chapter III, expenses for labour (in common with other inputs) can be increased by using larger quantities to produce a given amount of output and/or by paying higher prices for labour services. This chapter will investigate the first of these possibilities.

Measures of Labour Productivity

Rough measures of labour productivity are commonly obtained by calculating revenue passenger-miles, revenue ton-miles and operating revenues per employee. There are two conceptual shortcomings with this approach. First, many inputs are used jointly with labour to produce airline output, and their relative shares influence output per employee. For example, an airline utilizing more or larger aircraft (capital) relative to labour may be able to produce more output per employee than an airline using relatively fewer or smaller aircraft. In this case, however, the higher employee productivity is due to the use of larger quantities of aircraft rather than to a more effective use of personnel.

The second shortcoming is that there is no completely satisfactory measure of airline output. Revenue passenger-miles (RPM) are deficient in that they exclude cargo output. Revenue ton-miles (RTM) include all types of traffic, but the conversion of passenger traffic into the common ton-mile measure assumes an average weight of 200 pounds per passenger plus baggage (10 passengers per ton) and, as mentioned earlier, this may not accurately reflect the physical relationship between passenger and cargo traffic in airline production since it excludes the weight of such passenger-related facilities as seats, galleys, lavatories, etc., as well as cabin attendants. Thus, the true output of carriers with relatively large passenger operations might be understated relative to those with cargo operations when measured by RTM. A similar problem exists with the various cargo components in that more services are commonly provided for express than for freight, and mail often enjoys priority handling over freight and express; yet a ton-mile of each of these cargo services is counted the same. Of these two physical output measures, however, the greater inclusiveness of RTM makes it a better measure than RPM and therefore RTM will be used to indicate physical output throughout this study.

In economic terms, total operating revenues provide a measure of output that has certain advantages over physical measures. For example,

Table 15

Labour's Share of Total Operating Expenses
Canadian Mainline, Regional and Selected U.S. Carriers, 1975 & 1978

Carrier	Wages, Salaries, Benefits & Personnel Expenses (000)		Total Operating Expenses (000)		Labour Per Cent of Total Operating Exp.	
	1975	1978	1975	1978	1975	1978
Mainline						
Air Canada	$392,458[a]	$ 541,342[a]	$ 917,876	$1,238,098	42.8	43.7[b]
CP Air	127,328[c]	168,853[d]	329,018	421,985	38.7	40.0
Trunk						
Trans World	753,448	1,053,509	1,886,863	2,425,659	39.9	43.4
Northwest	237,123	234,874	764,941	726,424	31.0[b]	32.3[b]
Delta	597,098	918,223	1,358,096	2,013,216	44.0	45.6
Intrastate						
Air Calif.	n.a.	25,277	35,213	63,868	n.a.	39.6
Air Florida	1,008[e]	4,186	3,086[e]	16,569	32.7[e]	25.3
PSA	46,288[f]	79,562	147,537	215,683	31.4	36.9
Southwest	5,537	19,763	17,860	59,943	31.0	33.0
Regional						
East. Prov.	12,282[c]	17,932[d]	35,641	50,064	34.5	35.8
Nordair	16,779[c]	23,296[d]	42,484	61,162	39.5	38.1[b]
Pac. Western	34,992[c]	55,184[d]	97,378	132,860	35.9	41.5[b]
Quebecair	13,610[c]	22,153[d]	43,648	72,311	31.2	30.6[b]
Transair	9,938[c]	14,027[d]	28,427	40,542	35.0	34.6
Local Service						
Allegheny	169,849	241,132	373,941	532,590	45.4	45.3
Frontier	74,324	128,114	156,228	274,024	47.6	46.7
N. Central	72,968	120,249	156,363	263,748	46.7	45.6
Southern	47,431	77,316	114,665	180,808	41.4	42.8

Sources: Appendices C and J; Air Canada (c); Air Florida (o), 1975; CAB (p), Dec. 1977, p. 134; PSA (h), (j) and (n); SC(ASC) (b), Oct.-Dec. 1975, Table 4, (n) and (r); Southwest (h), Dec. 1976, Schedules C.1 and D.1

[a]See note a to Table J.1.

[b]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[c]Benefits for employees in flying operations were estimated to be 70 per cent of 1975 other expenses, based on actual data for Air Canada. Also, see note a to Table J.1.

[d]Benefits for employees in flying operations were estimated to be 90 per cent of 1978 other expenses, based on actual data for Air Canada. Also, see note a to Table J.1.

[e]Eleven months ended June 30, 1975

[f]Personnel expenses were estimated to be 5.0 per cent of salaries, wages and benefits, based on 1978 actual data for PSA.

revenues provide a rough indication of the different values of various airline services to consumers. To use an analogy, the physical measures of a ton of lead and a ton of gold are the same, but the values of these two goods are quite different. The same can be true for passenger and cargo services, but one should not assume that the former is always of higher value than the latter.

Total revenues do not, however, provide a perfect measure of output. For example, they can be misleading if there are large differences in carrier fares (as Chapter I demonstrated to be the case). In that situation, total revenues for low-fare airlines will be lower than for high-fare airlines for the same physical quantities of output having similar service qualities. In economic terminology, the total values of the services provided by the two carriers could be the same, but for the low-fare carrier the total value would be allocated as relatively low carrier revenues and high consumer surplus, while the high-fare carrier would have higher revenues and lower consumer surplus. Of course, total values would provide the best economic measure of output, but that measure is not observable in the real world.

Another advantage of total operating revenues is that they provide a more flexible measure of output than do RTM. Not only do total revenues include transportation activities, but they can also measure production not directly applicable to an airline's own transport services. For example, they can include the output resulting from providing maintenance, catering, reservations, ground handling and such services for other airlines. At the same time, a monetary measure of output also facilitates making adjustments to reflect differences in the relative use of internal resources versus outside services in production (make versus buy). For example, beginning in 1977 when it purchased five DC-9-15s from Air Canada, Air Florida had a large increase in outside maintenance expenses because Air Canada continued to perform the major maintenance on these aircraft. Similarly, during 1975-78, Southwest had its turbofan engines overhauled by Trans World, while Pacific Southwest Airmotive did this work for PSA. Detailed expense reports show that all the federally-regulated airlines also purchased maintenance services from outside firms. Therefore, a more accurate and comparable indication of each airline's output per employee would be obtained by subtracting their outside maintenance expenses from their total operating revenues or, in the case of PSA, including Pacific Southwest Airmotive's employees <u>and</u> operating revenues with those of the airline. These adjustments will be made in Table 17. It would also be desirable to make similar adjustments for all air transportation inputs purchased from outside sources, but due to lack of detailed information this is not feasible at this time. The adjustment for outside maintenance, however, covers a major portion of such expenses and significantly reduces possible inaccuracies from this source.

A final complication in comparing revenues per employee of the Canadian and U.S. airlines results from the exchange rate problem. The problem is negligible for 1975 and 1976 since the two currencies exchanged within

less than two per cent of par during those years. In 1977, however, the Canadian dollar averaged 5.9 per cent below the U.S. dollar, falling to 12.4 per cent in 1978 (Finance Canada, April 1979, p. 217). To the extent that Canadian carriers sold transborder or international transportation at prices based on the U.S. dollar (the common practice in international air transportation) their operating revenues were increased in terms of Canadian dollars, just as is the case with any other export. All this should increase 1977-78 operating revenues per employee for Canadian airlines measured in Canadian dollars relative to operating revenues per employee for U.S. airlines measured in U.S. dollars. Table 6 shows that Air Canada's transborder and international RTM comprised 50 per cent of its total RTM during 1975-78, while CP Air's comprised about 65 per cent of its total RTM. Therefore, the maximum effects of exchange rates on Air Canada's data would be about three per cent in 1977 and six per cent in 1978, while the effects on CP Air's data would be about four and eight per cent.

Finally, a shortcoming in the available employee data is that, with few exceptions, employee data are not available by area of operation. In 1977, the CAB instituted a new reporting procedure that resulted in Trans World and Northwest allocating their employee counts in accordance with where services were operated rather than where employees were based, but Delta continued to report in the old manner [CAB (o), 1975-78].[1] The Canadian carriers report only total system employees without a breakdown by area of operation. Therefore, the intercarrier comparisons of employee output in this study must be on a total system basis.[2]

The above limitations in the various output and input measures should be kept in mind when evaluating the following comparisons of employee productivity among the airlines. These comparisons will utilize first RTM per employee and then total operating expenses per employee.

RTM per Employee

Figure 4 depicted the fact that total operating expenses per RTM decrease with increases in operating distances (measured by average passenger trip length). Since labour is a major component of airline costs, this implies that labour productivity increases with distance. This section will identify the relationship between distance and labour productivity among the Canadian and U.S. airlines, and will then compare the carriers after the common effects of distance are eliminated.

Table 16 gives each carrier's weighted average system RTM per employee for the years 1975-78, together with its average system trip length for combined scheduled and charter passengers. These data, and the best-fit trend line for the federally-regulated airlines (excluding Northwest), are then plotted on Figure 8.[3] The expected positive relationship between distance and labour productivity is clearly evident in Figure 8. The trend line and the associated high R^2 of .837 demonstrate a high degree of similarity between the Canadian and U.S. federally-regulated airlines in terms of RTM per employee, as was also true for total operating expenses per RTM (see Figure 4).

Table 16

Total System RTM per Employee and System Trip Lengths
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	System Trip Length[a]	1975-78 Average Total System RTM per Employee			
		Actual	Trend[b]	Deviation RTM/Employee[c]	Deviation Per Cent[d]
Mainline					
Air Canada	1,064	72,193	77,374	-5,181	-6.7%
CP Air	1,789	82,684	87,062	-4,378	-5.0
Trunk					
Trans World	1,390	88,089	82,700	5,389	6.5
Northwest	1,110	144,783	79,342	65,441	82.5
Delta	636	74,789	65,305	9,484	14.5
Intrastate					
Air Calif.	341	81,344[e]	48,239	33,105	68.6
Air Florida	268	49,002[f]	41,797	7,205	17.2
PSA	318	77,208	46,342	30,866	66.6
Southwest	284	94,456	43,319	51,137	118.0
Regional					
East. Prov.	444	45,757	55,928	-10,171	-18.2
Nordair	1,067	84,009	77,433	6,666	8.6
Pac. Western	383	58,384	51,989	6,395	12.3
Quebecair	771	79,054	70,062	8,992	12.8
Transair	707	59,795	67,951	-8,156	-12.0
Local Service					
Allegheny	323	51,690	47,469	4,221	8.9
Frontier	406	50,976	53,544	-2,568	-4.8
N. Central	253	41,081	41,150	-69	-0.2
Southern	329	46,491	47,954	-1,463	-3.1

Sources: Calculated from data in Appendices E, G, H and I

[a]Total system scheduled plus charter RTM divided by total system passengers (see footnote 1, Chapter III) yields distance in statute miles.

[b]Calculated from data for the federally-regulated airlines (excluding Northwest) using the equation: $Y = X/(.004 + .000009X)$, $R^2 = .837$

[c]Actual RTM per employee minus trend values

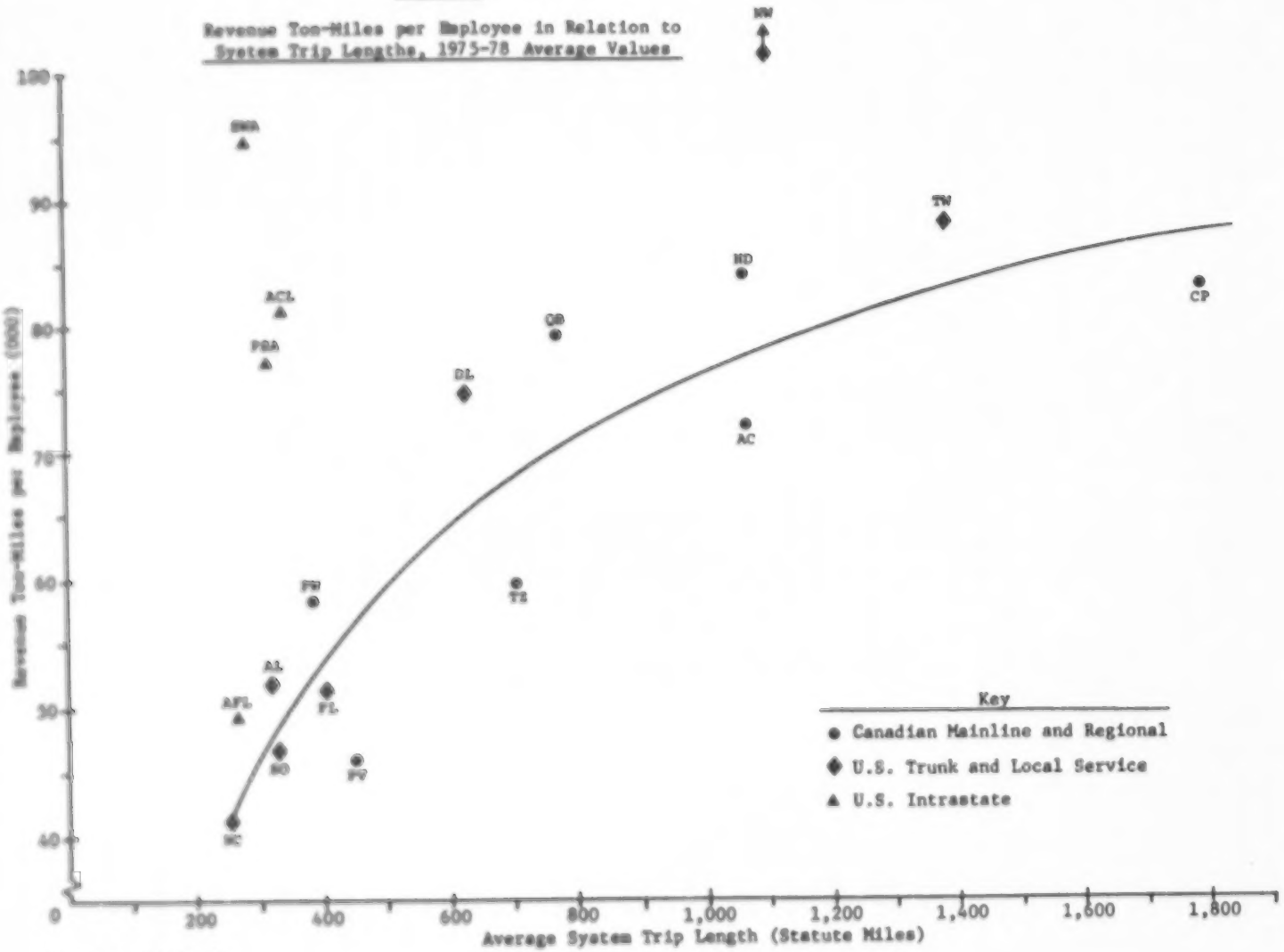
[d]Deviation per cent of trend value

[e]1977-78 average

[f]1978 only

Figure 8

Revenue Ton-Miles per Employee in Relation to System Trip Lengths, 1975-78 Average Values



Source: Table 16

There are four major deviations from the trend line. Southwest lies 118 per cent above the line, Air California and PSA are about 67 per cent higher and Northwest lies 82.5 per cent above the line. Clearly, these four carriers have achieved much greater labour productivity than the other carriers, after adjusting for the effects of distance.

For the purposes of estimating the effects of government regulation on airline performance, it would have been convenient had Northwest's RTM per employee been located down near the trend line, and had Air Florida's been appreciably higher than 17.2 per cent above the line. Since this is not the case, it appears that federal regulation does not necessarily prevent high labour productivity and that its absence does not guarantee it. However, it should be recognized that, after adjusting for distance, the majority of the successful intrastate carriers managed to achieve exceptionally high labour productivity (in terms of RTM per employee), while Northwest has been unique in this respect among the federally-regulated North American airlines [CAB (n), p. 11].

Figure 8 also shows that both Air Canada and CP Air, plus two of the five Canadian regional carriers, fell somewhat below the trend line. It happens that the three Canadian carriers lying above the trend, Quebecair, Nordair and Pacific Western, all operated more than half of their total system RTM in charter services during these years (72.3, 64.1 and 51.9 per cent respectively), while Air Canada and CP Air operated only 5.1 and 7.3 per cent of their total RTM in charter services (see Table 7). From this one might conclude that high labour productivity results from large charter operations, but it should not be forgotten that the two Canadian carriers with relatively low labour productivity (Eastern Provincial and Transair) also operated relatively large charter services (23.5 and 46.8 per cent of total RTM). Thus, the evidence about the effects of charter operations on labour productivity is inconclusive, especially when it is recognized that the Canadian carriers' deviations from the trend line were small relative to those of the three largest intrastate carriers and Northwest, none of which had large shares of charter services.

The above brings to mind the possibility that the key to large RTM per employee may lie in specialization. Carriers that tend to specialize (operating a large volume of charter service or a large volume of scheduled service between just a few cities) may be more productive than those that provide a variety of services between many city pairs. Again, Northwest appears to be inconsistent with this example, but further investigation may prove it to be specialized in other significant respects.

Figure 8 also implies that larger aircraft do not necessarily yield appreciably lower average costs than small aircraft. Of course, there is a positive relationship between distance and aircraft size, with long-haul services being provided with relatively large aircraft at any point in time, and the upward sloping trend line in Figure 8 may reflect the effects of both distance and aircraft size. However, Air California, PSA and Southwest

operated relatively small aircraft during 1975-78; yet they had high outputs per employee even without adjusting for distance.[4] Also, with virtually the same average passenger trip length, Nordair had appreciably higher RTM per employee than did Air Canada even though, on average, its aircraft were smaller.[5] Of course, these data do not tell whether still greater RTM per employee might have been produced with large aircraft operated by small airlines that were not constrained within very limited geographic areas or by restrictive operating rights as were the intrastate carriers and Nordair during 1975-78. Current developments in the United States, where small airlines such as Capitol International and World are being allowed to operate long-haul scheduled services with large aircraft, may provide better information on the relationship between aircraft size and productivity during the next few years.

Overall, this section demonstrates that the federally-regulated Canadian and U.S. airlines (except Northwest) were very similar in their production of RTM per employee during 1975-78, and that the three largest intrastate carriers plus Northwest had labour productivity 66.6 to 118.0 per cent higher than the trend values of these other airlines. Certainly a portion of the intrastate carriers' lower operating expenses per RTM can be attributed to their higher labour productivity, but the question remains as to why they (and Northwest) were able to be so successful in this important aspect of operating costs.

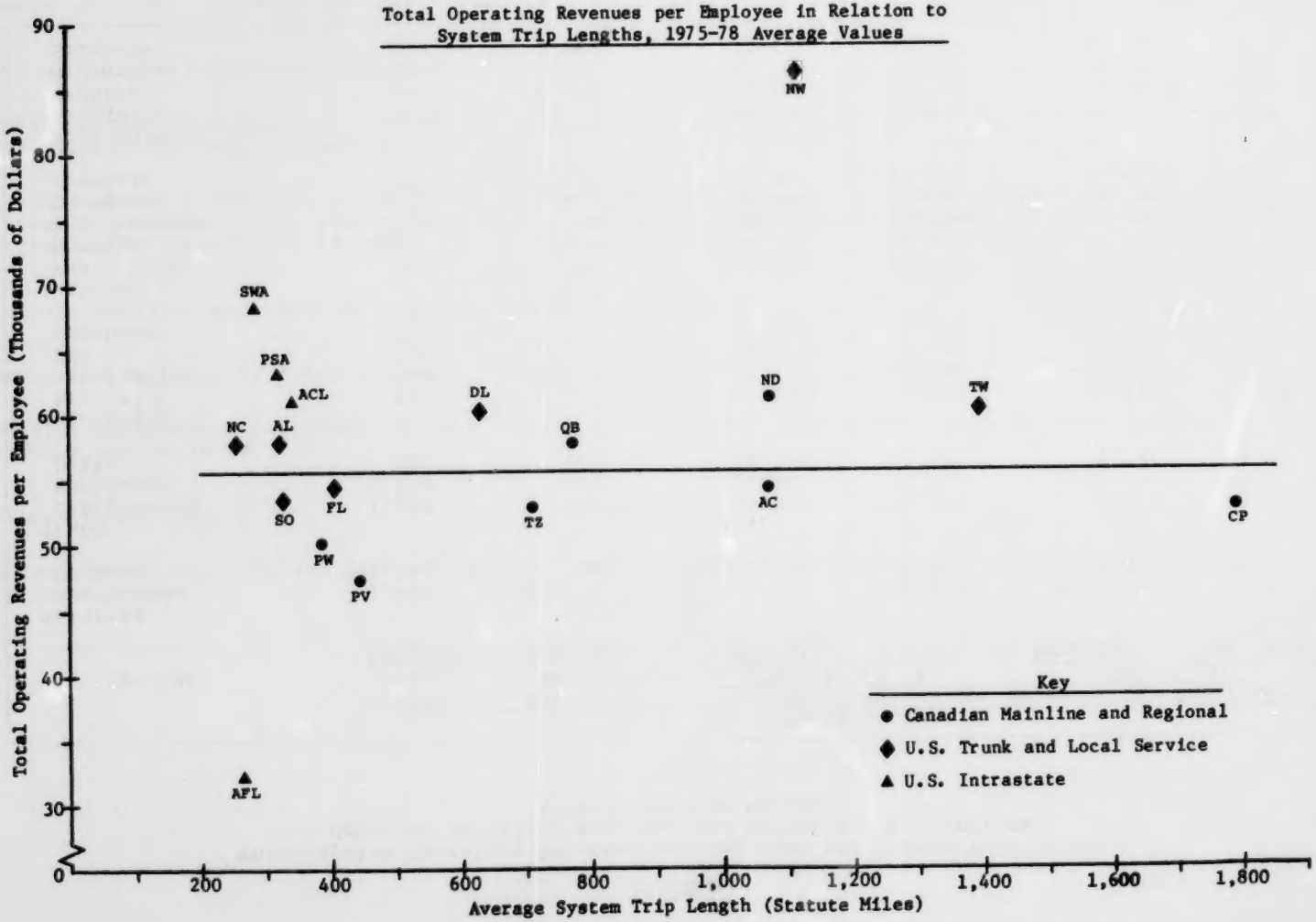
Finally, the relationships between distance and output per employee raise further doubt about the existence of significant economies of scale in the airline industry due to firm size. First, the fact that the three largest (but still small) intrastate carriers had outputs per employee equal or superior to very much larger carriers (irrespective of average passenger trip lengths) is quite inconsistent with the existence of scale economies. Second, economies of scale are also challenged by the fact that Nordair had greater output per employee than Air Canada (at roughly the same average trip length), and that Nordair, Pacific Western and Quebecair all held roughly the same positions relative to the trend line as Delta and Trans World. None of these would be the case if firm size were an important factor in decreasing average costs.

Operating Revenues per Employee

Table 17 and Figure 9 indicate average employee productivity measured in terms of total operating revenues for 1975-78, net of outside maintenance expenses. Figure 9 shows that distance had no discernible effect on total operating revenues per employee. Clearly, the higher yields of the short-haul regional and local service carriers offset their lower physical outputs, while the opposite was true for the mainline and trunk carriers with their higher RTM per employee being balanced by their lower yields for longer trip lengths. The best-fit trend line for the federally-regulated airlines (excluding Northwest) is a straight line fitted to the logarithms of the variables. The R^2 for even this regression, however, is only .052, so there is no statistically significant relationship between

Figure 9

Total Operating Revenues per Employee in Relation to System Trip Lengths, 1975-78 Average Values



Source: Table 17

Table 17

Total System Operating Revenues per Employee and System Trip Lengths
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	System Trip Length[b]	Outside Maint. Exp./Emp.	1975-78 Average Total System Op. Revenues per Employee[a] (Can. & U.S. $) Actual	Trend[c]	Deviation Rev./Emp.[d]	Per Cent[e]
Mainline						
Air Canada	1,064	$ 366	$54,341	$55,500	$ -1,159	-2.1%
CP Air	1,789	735	52,638	55,500	-2,862	-5.2
Trunk						
Trans World	1,390	349	60,514	55,500	5,014	9.0
Northwest	1,110	800	86,346	55,500	30,846	55.6
Delta	636	181	60,236	55,500	4,736	8.5
Intrastate						
Air Calif.	341	n.a.[f]	61,292[f]	55,500	5,792[f]	10.4[f]
Air Florida	268	1,513[f]	32,375[g]	55,500	-23,125	-41.7
PSA	318	0[h]	63,011[h]	55,500	7,511	13.5
Southwest	284	2,531	68,282	55,500	12,782	23.0
Regional						
East. Prov.	444	995	47,431	55,500	-8,069	-14.5
Nordair	1,067	2,859	61,335	55,500	5,835	10.5
Pac. Western	383	758	50,043	55,500	-5,457	-9.8
Quebecair	771	3,902	57,799	55,500	2,299	4.1
Transair	707	1,169	52,892	55,500	-2,608	-4.7
Local Service						
Allegheny	323	1,570	58,113	55,500	2,613	4.7
Frontier	406	2,037	54,169	55,500	-1,331	-2.4
N. Central	253	1,400	57,709	55,500	2,209	4.0
Southern	329	1,893	43,438	55,500	-2,062	-3.7

Sources: Calculated from data in Appendices C, G, H and I; outside maintenance expenses from: Air Canada (c); CAB (e); Peat, Marwick, Mitchell & Co., "1978"; Southwest (h), Schedule E.2; SC(ASC) (n)

[a]Net of outside maintenance expenses

[b]Total system scheduled plus charter RPM divided by total system passengers (see footnote 1, Chapter III), yields distance in statute miles.

[c]No statistically significant relationship could be found between operating revenues per employee and system trip lengths. The simple average of revenues per employee for the federally-regulated airlines (excluding Northwest) was $55,435.

[d]Actual operating expenses per employee minus trend values

[e]Deviation per cent of trend values

[f]Outside maintenance expenses were not available. Therefore, the actual value is gross operating revenues per employee.

[g]Fiscal years 1975-78

[h]No adjustment was required since Pacific Southwest Airmotive's revenues and employees are included in the actual value.

total operating revenues per employee and passenger trip length.[6] Indeed, a horizontal line at around $55,500 adequately represents the federally-regulated airlines' total operating revenues per employee (net of outside maintenance expenses) averaged for the years 1975-78. This constant value will be used as the trend line in the following analysis.

As was the case for RTM per employee, Quebecair and Nordair lie above the trend line, while Air Canada, CP Air, Eastern Provincial and Transair continue to lie below it. Pacific Western's position changed from above the trend line for RTM per employee to below the horizontal trend line for total operating revenues per employee. This brings five of the seven Canadian carriers below the average (even though their transborder and international revenues were measured in Canadian dollars), while five of the seven U.S. carriers were above the average. Thus, the intercountry similarities were less for operating revenues than for RTM per employee, but the differences were still not large. The only consistent pattern among the two productivity measures is that those for the Canadian mainline carriers were all 2.1 to 6.7 per cent below the trend lines, while those for Delta and Trans World were 6.5 to 14.5 per cent above the lines, and Northwest maintained its outstanding performance with 82.5 and 55.6 per cent positive deviations.

While the regional and local service carriers' outputs per employee were raised by using operating revenues as the output measure, those for the short-haul U.S. intrastate carriers were lowered by their low yields per passenger mile (see Table 9). The combination of low RTM per employee and somewhat lower yields resulted in Air Florida having the lowest operating revenues per employee among all 18 carriers. In contrast, Air California, PSA and Southwest still had operating revenues per employee that were 10.4 to 23.0 per cent above the average for the federally-regulated airlines (excluding Northwest). These percentage deviations were equal to or above all the federally-regulated airlines except for Northwest's 55.6 per cent deviation, and they provide one indication of why these intrastate carriers were able to be as profitable as the federally-regulated airlines while offering much lower fares to short-haul passengers. Their much greater physical outputs per employee played an important role in making up for the effects of their low fares.

Labour Productivity by Employee Category

Total employment data are available for six major categories -- pilots and copilots, other flight personnel, maintenance labour, aircraft and traffic servicing, general management, and other employees (see Appendix I). Given the large differences in physical productivity for total employees, it is desirable to compare the carriers on the basis of their RTM per employee for each category to determine if deviations in total employee productivity are broadly based or are due to just a few employee categories. Because of apparent differences in criteria used by three of the Canadian regional carriers in allocating personnel between the general management and the other employees categories, it has been necessary to combine

Table 18

Total System RTM per Employee by Employee Category[a]
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	Total System RTM per Employee, 1975-78 Average				
	Pilots & Copilots	Oth. Flt. Personnel[b]	Maint. Labour	A/C & Tra. Servicing	Gen. Mgt. & Other
Mainline					
Air Canada	996,251	419,976	475,819	198,390	259,485
CP Air	1,089,270	558,849	521,327	315,455	215,339
Trunk					
Trans World	877,478	489,991	508,188	260,419	362,238
Northwest	1,146,353	523,327	1,326,322	353,976	844,242
Delta	722,688	435,799	615,618	146,332	659,208
Intrastate					
Air Calif.	n.a.	n.a.	n.a.	n.a.	n.a.
Air Florida	466,467	327,967	574,029	109,787	233,616
PSA	594,323	447,647	515,103	189,154	542,165
Southwest	895,263	564,027	1,001,233	183,885	781,217
Regional					
East. Prov.	435,793	264,784	153,989	154,764	311,407
Nordair	572,610	462,560	430,280	333,120	328,012
Pac. Western	484,546	332,778	275,473	158,858	322,068
Quebecair	530,815	431,298	473,942	282,621	328,031
Transair	456,936	401,000	269,667	296,926	190,390
Local Service					
Allegheny	436,658	422,479	362,426	110,078	327,954
Frontier	372,319	445,009	299,116	128,017	268,207
N. Central	301,277	327,567	285,139	94,650	239,606
Southern	367,531	404,249	498,921	104,750	202,544

Sources: Calculated from data in Appendices E and I

[a]See notes to Tables A.1 and A.2 for the definitions of these categories.

[b]These data are passenger RTM per employee since cabin attendants do not contribute to producing cargo output. All other data are based on total (passenger plus cargo) RTM per employee.

[c]1978 only

Table 19

Deviations of Actual RTM per Employee from Trend Values by Employee Category[a]
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	Percentage Deviations, Actual RTM per Employee from Trend					
	Pilots & Copilots[b]	Oth. Flt. Personnel[c]	Maint. Labour[d]	A/C & Tra. Servicing[e]	Gen. Mgt. & Other[f]	Total Employees[g]
Mainline						
Air Canada	26.5%	-9.1%	6.5%	-28.5%	-7.2%	-6.7%
CP Air	-0.2	0.5	-6.2	3.1	-23.0	-5.0
Trunk						
Trans World	-5.8	-2.8	2.5	-11.4	29.6	6.5
Northwest	41.8	11.8	192.2	26.2	201.9	82.5
Delta	26.7	7.2	60.8	-36.4	135.8	14.5
Intrastate						
Air Calif.	n.a.	n.a.	n.a.	n.a.	n.a.	68.6
Air Florida[h]	41.1	-8.6	75.2	62.0	-16.4	17.2
PSA	61.5	22.6	53.7	69.1	93.9	66.6
Southwest	161.1	56.3	203.4	120.0	179.4	118.0
Regional						
East. Prov.	-4.3	-30.6	-56.5	-13.5	11.4	-18.2
Nordair	-27.4	0.0	-3.8	20.0	17.3	8.6
Pac. Western	16.8	-10.9	-20.1	4.6	15.8	12.3
Quebecair	-17.5	1.7	17.6	12.8	17.3	12.8
Transair	-25.0	-3.5	-31.5	22.8	-31.9	-12.0
Local Service						
Allegheny	17.2	15.5	7.9	-4.7	17.3	8.9
Frontier	-13.5	18.1	-14.1	-21.5	-4.1	-4.8
N. Central	-5.8	-8.2	-12.4	85.1	-14.3	-0.2
Southern	-2.5	10.2	48.2	-12.5	-27.6	-3.1

Sources: Calculated from data in Tables 16 and 18

[a]See notes to Tables I.1 and I.2 for the definitions of these categories.

[b]The trend line was calculated from data for the federally-regulated airlines using the equation: $Y = 9{,}929.343X^{.627}$, $R^2 = .783$.

[c]The trend line was calculated from passenger RTM per employee data for the federally-regulated airlines using the equation: $Y = 324{,}017 + 129.631X$, $R^2 = .597$.

[d]The trend line was calculated from data for the federally-regulated airlines (excluding Northwest) using the equation: $Y = 287{,}378 + 149.967X$, $R^2 = .281$.

[e]The trend line was calculated from data for the federally-regulated airlines using the equation: $Y = 348{,}096 - 75{,}126{,}520/X$, $R^2 = .726$.

[f]The trend line was calculated as the simple average of the data for the federally-regulated airlines (excluding Delta and Northwest) = 279,600. No statistically significant relationship was found between RTM per general management and other employees, and passenger trip length.

[g]See note b to Table 16.

[h]1978 only

these two categories to provide consistent data for all carriers (see note h to Table I.4). This reduces the number of categories from six to five. The RTM per employee for each of these five categories are given in Table 18.

Best-fit trend lines were calculated from the data in Table 18 for each employee category, and Table 19 summarizes the percentage deviations of the actual values from the trend values for each category. The consistently superior performances of Northwest, PSA and Southwest are evident from the large positive percentages by which their actual values deviated from the trend values for every employee category. The large positive total employee percentage for Air California implies that it too shared in this consistently superior performance, but lack of information regarding the allocation of its employees by category prevents this from being verified.

Seven other carriers also had a high degree of consistency among the five employee categories, with the percentages for all but one category having the same sign. Delta, Quebecair and Allegheny had generally high employee productivity in most categories, with only one category having a negative deviation. In contrast, Eastern Provincial, Transair, Frontier and North Central each had only one positive deviation, with the remaining four all being negative. The other seven carriers were less consistent in that each had roughly the same number of positive or negative deviations. Notice that both Canadian and U.S. carriers are in each of these groupings.

The single employee category whose deviations were most closely related with total employee productivity was the general management and other employees category. For both Canadian and U.S. carriers, the deviation for total employee productivity tended to have the same sign as that for the general management and other employees category. The only exceptions were Air Florida and Eastern Provincial. Thus, for almost all North American carriers studied, high employee productivity among white collar employees was associated with relatively high total employee productivity, regardless of geographic location.

Summary

Since labour is the input comprising the largest single share of total airline expenses, low average costs should be associated with high labour productivity. This chapter demonstrates that this was indeed the case for Air California, PSA and Southwest, as well as Northwest. Furthermore, the productivity comparisons also show that the federally-regulated airlines (excluding Northwest) were very similar in terms of employee productivity but differed markedly from the three largest intrastate carriers and Northwest.

Among the Canadian carriers, Nordair and Quebecair had above average employee productivity under both measures, while Air Canada, CP Air, Eastern Provincial and Transair were below average. Pacific Western, at the same time, had above average employee productivity in terms of RTM and below average in terms of operating revenues. A similar mix of above and below

average performances existed for the U.S. federally-regulated airlines, with the trunk carriers being somewhat superior in both measures, and with Frontier and Southern being consistently below average.

Increasing RTM per employee among the federally-regulated airlines was closely associated with distance (as measured by system passenger trip length). In contrast, there was essentially no relationship between total operating revenues (net of outside maintenance expenses) per employee and distance since the low productivity of short-haul operations were offset by the high fares-per-mile for these services, and vice versa for long-haul operations. Even after accounting for distance, however, Air California, PSA, Southwest and Northwest had RTM per employee that ranged from 66.6 to 118.0 per cent above the trend line. Clearly, these carriers differed significantly in this important measure of productivity from the other carriers. The low fares-per-mile of the three largest intrastate carriers, however, resulted in their total revenues per employee being "only" 10.4 to 23.0 per cent above the average of the federally-regulated airlines. Such high employee productivity is one reason why these intrastate carriers could achieve equal or superior profitability while offering low fares to their passengers.

The evidence in this and previous chapters indicates that differences in labour productivity were not due to economies of scale resulting from firm size. Tables 6 and 8 show that the intrastate carriers were small by any measure, and even Northwest was not large in relation to Delta and Trans World, while being about the same size as Air Canada. Yet, after adjusting for distance, all of these carriers had higher employee productivity than Air Canada, Delta and Trans World (Table 16).

Footnotes

1. Under the old reporting procedure, for example, pilots that were based in the United states but flew international routes were counted as domestic employees. The same allocation held for airport, maintenance, sales, reservations, accounting and management personnel who worked on both domestic and international operations.

2. A more accurate measure of employee input would be total hours worked per year rather than number of employees. Such information is not submitted to the CAB or Statistics Canada by the airlines. Indirect evidence indicates, however, that the differences in hours worked per week are not large.

3. Based on the lowest mean squared error, the best fit was obtained from the following equation: $Y = X/(.004 + .000009X)$. The associated R^2 of .837 is significant at the one per cent level (see footnote 3, Chapter III).

4. Air California operated Boeing 737s and a few Lockheed Electras during 1975-78. PSA operated mainly Boeing 727s and 737s, with a few Elec-

tras and, during just the first quarter of 1975, two Lockheed L-1011s. Southwest operated only Boeing 737-200s during these years [Air California, PSA and Southwest, Annual Reports, 1975-78; also, PSA (e)].

5. During this period Nordair operated FH-227, Electra, B-737-200 and DC-8-61F aircraft, plus several smaller aircraft which it phased out of service. Air Canada, in contrast, operated DC-9s, B-727s, DC-8s of various models (including DC-8-61s), L-1011s and B-747s [SC(ASC) (k), Part 2].

6. Based on the lowest mean squared error, the best fit was obtained from the following equation: $Y = 45{,}925.441X^{.029}$. The associated R^2 of .052 is not significant at the five per cent level (see footnote 3, Chapter III).

Chapter VII

LABOUR PAYMENTS

Now that differences in labour productivity among the carriers have been identified, it becomes desirable to compare these carriers in terms of annual average payments to their employees. A carrier having relatively low output per employee can still have average employee costs per unit of output if its payments for labour are correspondingly low. Similarly, the advantages of relatively high output per employee can be lost by high payments to employees or, conversely, can be made even greater if payments are low. This chapter will compare the Canadian and U.S. carriers first on the basis of their annual payments per employee and, then, on employee payments per RTM.

Average Annual Payments per Employee

There are three general types of payments to employees. The first and largest is salaries and wages. The second covers payments for employee benefits such as insurance, pensions and other welfare plans, including payroll taxes for benefits supplied through governments. The third consists of personnel expenses covering reimbursements to employees (or payments directly to suppliers) for personal expenses incurred by employees in the course of their work -- with food, lodging and travel expenses for flight personnel accounting for 56 to 89 per cent of this item.[1]

Table 20 gives the average annual payments per employee in 1978 for the Canadian and U.S. carriers, broken down into salaries and wages for each of the six major employee categories and for all employees, total benefits (insurance-employee welfare) for all employees, and personnel expenses for all employees.[2] In addition, the simple average (mean) payment for each group of carriers is provided to facilitate overall comparisons. All payments are given in Canadian or U.S. dollars, as appropriate, without adjustment for the exchange rate. However, an adjustment of, say, 7.5 per cent to relfect any possible differences in domestic Canadian prices in Canadian dollars versus domestic U.S. prices in U.S. dollars would have little effect on the overall conclusions of this analysis.[3]

Grand totals. Using simple averages, the U.S. trunk carriers had the highest annual payments per employee at almost $30,000, followed by the U.S. local service carriers with an average about eight per cent lower at around $27,500. In each group, the carrier based in the south (Delta or Southern) had the lowest average total payment. The Canadian mainline carriers came third with an average of just over $25,000, followed by the Canadian regional carriers with a group average of just over $22,000, about 12 per cent lower than the mainline group.

Table 20

Average Annual Payments to Employees by Category
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	Average Annual Payments per Employee (Canadian or U.S. Dollars)										
	Salaries and Wages							Benefits and Expenses			
	Pilots & Copilots	Other Flight Pers.	Maint. Labour	A/C & Traffic Serv.	General Mgt.	Other Employ.	Total	Ins.-Employ. Welfare	Pers. Expense	Total	Grand Total
Mainline[a]											
Air Canada	42,087	16,423	19,685	17,882	51,807	19,884	20,454	4,551	1,455	6,006	26,460
CP Air	42,613	18,377	18,921	17,824	35,064	17,846	20,146	2,401	1,613	4,014	24,160
Mean	42,350	17,400	19,303	17,853	43,436	18,865	20,300	3,476	1,534	5,010	25,310
Trunk											
Trans World	51,093	15,779	21,195	18,781	141,132	26,479[b]	23,862	5,288	1,451	6,739	30,601
Northwest	58,229	15,442	21,431	17,807	61,660	17,815[b]	22,474	6,316	1,642	7,958	30,432
Delta	51,644	16,173	18,428	19,589	111,166	27,096	23,097	4,283	1,065	5,348	28,445
Mean	53,655	15,798	20,351	18,726	104,653	23,797	23,144	5,296	1,386	6,682	29,826
Intrastate											
Air Calif.[c]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	18,806	3,574	852	4,426	23,232
Air Florida[d]	25,753	8,671	21,987	6,871	34,791	4,509	11,460	1,507	646	2,153	13,613
PSA	36,224	11,061	17,112	15,849	74,362[e]	16,415[e]	18,193	3,823	1,093	4,916	23,109
Southwest	32,022	9,787	20,576	11,822	33,543	12,576	15,073	3,577[f]	650	4,227	19,300
Mean	31,333	9,840	19,892	11,514	47,565	11,167	15,883	3,120	810	3,930	19,813
Regional[a]											
East. Prov.	34,761	12,852	17,933	15,719	26,138	13,916	17,990	1,075	1,428	2,503	20,493
Nordair	36,734	13,191	21,242	17,721	36,730	13,502	20,221	3,584	2,519	6,103	26,324
Pac. Western	44,500	17,312	19,664	17,956	19,056[g]	26,356[g]	21,545	n.a.[h]	1,183	n.a.[h]	22,728
Quebecair	35,369	12,918	22,004	17,483	21,553[g]	6,011[g]	19,205	1,215	1,384	2,599	21,804
Transair	33,114	15,269	19,438	13,153	15,285[g]	9,632[g]	17,007	1,920	942	2,862	19,868
Mean	36,896	14,308	20,056	16,406	23,752	13,883	19,194	1,948[i]	1,491	3,517[i]	22,243[i]
Local Service											
Allegheny	50,208	16,136	20,863	18,653	70,057	21,291[b]	23,051	4,382	1,134	5,516	28,567
Frontier	37,231	12,519	13,245	24,355	51,958	17,876	22,124	4,442	1,116	5,558	27,682
N. Central	45,726	14,132	16,566	21,936	96,793	19,192	23,262	4,477	1,139	5,616	28,878
Southern	41,283	12,973	17,624	17,034	50,609	17,466	20,203	3,439	973	4,412	24,615
Mean	43,612	13,940	17,074	20,494	67,354	18,956	22,160	4,185	1,090	5,275	27,435

Sources: Calculated from data in Appendices I and J

[a]See note a to Table J.1, note b to Table J.2 and note f to Table J.3.

[b]Excludes the following hotel, restaurant and food service personnel whose wage data were not reported to the CAB: Trans World = 1,473, Northwest = 318 and Allegheny = 18

[c]All figures were partially estimated from actual data for 1977 and the first ten months of 1978, and from estimated data for the last two months of 1978 and all of 1979. Employee data by category were not available.

[d]Payments to employees for the year ended July 31, 1978 divided by the average number of employees for calendar years 1977 and 1978

[e]General management average annual payments were calculated from the salaries of 15 corporate officers. The remaining three general management employees were included in the other employees category. Ten restaurant and food service personnel were excluded from other employees to be consistent with CAB practice.

[f]Includes $2,297 per employee paid in accordance with Southwest's profit-sharing plan.

[g]Pacific Western, Quebecair and Transair appear to have substantially different definitions for their general management and other employees categories (see Table I.4). The average annual payments for the combined general management and other employees categories were fairly consistent as follows: Eastern Provincial = $16,260, Nordair = $16,877, Pacific Western = $19,196 (including benefits), Quebecair = $14,864 and Transair = $12,062.

[h]Pacific Western does not report payments for insurance-employee welfare. Apparently such payments are included in salaries and wages.

[i]Excludes Pacific Western. Therefore, total benefits and expenses, and grand total payments do not equal the sum of their parts.

Not surprisingly, the intrastate carriers had the lowest average grand total at just under $20,000 -- a third lower than the trunk carrier average and 28 per cent lower than the local service carriers. It can be seen, however, that the intrastate carriers also had the largest range of payments, starting at $13,613 for the relatively young Air Florida, up to just over $23,000 for Air California and PSA, with these latter values being somewhat higher than all of the Canadian regional carriers, except Nordair. Overall, it seems proper to conclude that, except for Air Florida, total payments per employee for the U.S. intrastate and the Canadian regional carriers were similar, while the other carriers paid their employees up to 60 per cent more than Southwest's employees received on average in 1978.

Personnel expenses. Calculations from the data in Table 20 show that total employee benefits and expenses accounted for 11.9 to 26.2 per cent (Quebecair and Northwest) of grand total payments per employee, with an overall simple average of 19.0 per cent. Most of these differences were due to the wide range in employee benefits (insurance-employee welfare). Personnel expenses, in contrast, were quite homogeneous among the carriers having similar geographic areas of operations. That is, carriers having substantial international and transborder operations (Air Canada, CP Air, Trans World, Northwest, Nordair and Quebecair) all had relatively high personnel expenses (usually from $1,400 to $1,650), while such expenses were generally lower ($650 to $1,200) for carriers with largely domestic operations (Delta, the U.S. intrastate carriers, Pacific Western, Transair and the U.S. local service carriers).[4] Eastern Provincial was the only exception to this dichotomy, with rather high personnel expenses ($1,428) despite its substantial domestic operations.

Since personnel expenses largely cover travel, lodging and meals for flight personnel, such services purchased in foreign countries are direct imports and payments for them should be adjusted by the full exchange rate. This would tend to reduce the personnel expenses of Canadian carriers (measured in U.S. dollars) and leads to the conclusion that, except for Nordair, the international Canadian carriers were generally lower in this factor than the international U.S. carriers in absolute terms, but were somewhat higher in relative terms since their grand total payments per employee were lower than the U.S. carriers.[5]

Benefits. There was no completely consistent pattern among the carriers with regard to employee benefits (insurance-employee welfare). The U.S. carriers tended to have higher levels than the Canadian carriers, but there were exceptions in each country. Four of the seven U.S. trunk and local service carriers paid benefits ranging from $4,283 to $4,477 per employee, but Southern paid only $3,439 and Trans World and Northwest paid $5,288 and $6,316 per employee, respectively. Three of the intrastate carriers were just above Southern at $3,574 to $3,823 per employee, but $2,297 of Southwest's $3,577 total came from its profit-sharing plan, so that its remaining $1,280 in benefits were even below the $1,507 paid by Air Florida.

In contrast to most of the U.S. carriers, four out of six Canadian carriers (data not being available for Pacific Western) had low employee benefits ranging from $1,075 to $2,401 (Eastern Provincial to CP Air). Only two Canadian carriers paid benefits similar to the U.S. carriers -- Air Canada at $4,511 and Nordair at $3,584, which were roughly comparable to Delta and Southern.

Overall, there was enough variance among the airlines in each country to indicate that considerable latitude exists for independent bargaining or corporate decisions to affect this factor and the resulting allocation of total employee compensation among the three types of payments. For example, the almost identical grand total payments for Trans World and Northwest were due to the lower salaries and wages paid by Northwest being completely offset by higher employee benefits. In contrast, almost identical salaries and wages for Air Canada and CP Air did not result in equal grand total payments because Air Canada's benefits were $2,150 higher than CP Air's. While this $2,150 difference may not seem unduly large, multiplying it by 20,459 employees yields $44.0 million, or about 8.1 per cent of Air Canada's total employee costs and 52 per cent of its $84.1 million income before taxes (profit) in 1978 [Air Canada (a), 1978, p. 4].

Salaries and wages. The same overall ranking existed among the means of total salaries and wages per employee as among the grand total of all payments per employee -- the U.S. trunks paid the highest salaries and wages, followed by the local service carriers, then the Canadian mainline carriers, the Canadian regional carriers and, finally, the U.S. intrastate carriers. However, the differences were appreciably smaller and considerable overlap occurred among the federally-regulated airlines of each country. Indeed, if Southern is excluded, the total salaries and wages per employee of the U.S. trunk and local service carriers were virtually indistinguishable; while excluding Eastern Provincial and Transair yields similar salaries and wages among the remaining Canadian mainline and regional carriers (after deleting around $1,200 for benefit payments included in Pacific Western's salaries and wages). It can be seen that salaries and wages were lower in Canada than in the United States and, for the airlines within each country, the main differences in grand total payments were due to differences in employee benefits much more often than to differences in salaries and wages.

Finally, the similarity between the salaries and wages of the U.S. intrastate carriers and the Canadian regional carriers was maintained for Air California and PSA, but Southwest joined Air Florida in falling somewhat below the lowest of the regional carriers and well below that of the federally-regulated airlines in the United States. Overall, it appears that without federal regulation, total salaries and wages per employee would be lower in each country, with Canadian carriers paying somewhat less than U.S. carriers.

In terms of the six individual employee categories, Table 20 shows that general management had the highest average salaries for all the airlines except the Canadian regional carriers, where there appears to be some

confusion between the general management and other employees categories (see Table I.4 and note g to Table 20). These salaries ranged from $33,543 (Southwest) to $141,132 (Trans World). Of course, the next highest paid group of employees were the pilots and copilots. The same carrier-group rankings that applied to total salaries and wages applied to this category, and pilot salaries and wages ranged for $25,753 (Air Florida) to $58,229 (Northwest).

The remaining four employee categories had average salaries and wages that generally fell between $15,000 and $21,000 per employee. Deviations below this range were found primarily for other flight personnel (cabin attendants) for all the U.S. intrastate carriers, three of the Canadian regional and three of the U.S. local service carriers. Air Florida and Southwest also paid their aircraft and traffic servicing personnel and their other employees less than $15,000, but all the intrastate carriers paid average wages for maintenance labour. Four of the Canadian regional carriers appear to have paid their other employees less than $15,000, but the apparent differences in employee classification used by these carriers make it unwise to rely too heavily on their data for this category. Finally, only Transair among the regional carriers paid aircraft and traffic servicing personnel less than $15,000.

Deviations above $21,000 were found mainly among maintenance labour (Trans World, Northwest, Air Florida, Nordair and Quebecair) and other employees (Trans World, Delta, perhaps Pacific Western, and Allegheny). Only Frontier and North Central paid more for aircraft and traffic servicing. In the case of Frontier, however, the high average in this category looks questionable in relation to the unusually low average for maintenance labour. It may well have been that Frontier used different interpretations in allocating some personnel between these two categories.

Thus, the two Canadian mainline carriers fell within the $15,000 to $21,000 range for all four categories while the U.S. trunk carriers had only four deviations -- all on the high side. In contrast, the intrastate carriers were frequently below $15,000, as were the Canadian regional and U.S. local service carriers with regard to other flight personnel. Clearly, the larger carriers paid the higher salaries and wages in these (and other) categories.

Employee Payments per RTM

Dividing annual payments to all employees by total system RTM yields payments per RTM, one measure of employee costs per unit of output. These calculations for 1978 are given in Tables 21 and 22 for total salaries and wages, benefits, personnel expenses and, finally, grand total payments. They are then plotted against 1978 average system passenger trip lengths in Figures 10 through 13. Trend lines are also drawn on the figures indicating the relationships between employee payments per RTM and distance.

Table 21

Average Salaries & Wages per RTM, Benefits per RTM and System Trip Lengths
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	System Trip Length[a]	Employee Payments per RTM (Canadian or U.S. Cents) Salaries & Wages Actual	Trend[b]	% Dev.[c]	Benefits Actual	Trend[d]	% Dev.[c]
Mainline							
Air Canada	1,116	26.0¢	23.2¢	12.1%	5.8¢	4.8¢	20.8%
CP Air	1,797	21.4	20.3	5.4	2.6	2.3[e]	13.0
Trunk							
Trans World	1,400	24.1	21.6	11.6	5.3	4.6	15.2
Northwest	1,088	15.8	23.4	-32.5	4.4	4.9	-10.2
Delta	652	27.8	28.7	-3.1	5.1	5.7	-10.5
Intrastate							
Air Calif.	334	24.3	41.2	-41.0	4.6	7.8	-41.0
Air Florida[f]	291	24.0	45.0	-46.7	3.2	8.5	-62.4
PSA	320	24.6	42.4	-42.0	5.2	8.0	-35.0
Southwest	297	14.6	44.4	-67.1	3.5	8.4	-58.3
Regional							
East. Prov.	409	36.4	36.5	-0.3	2.2	2.3[e]	-4.3
Nordair	1,092	21.1	23.3	-9.4	3.7	4.8	-22.9
Pac. Western	406	34.7[g]	36.7	-5.4[g]	2.0[g]	-	-
Quebecair	806	22.4	26.1	-14.2	1.4	2.3[e]	-39.1
Transair	701	25.5	27.7	-7.9	2.9	2.3[e]	26.1
Local Service							
Allegheny	327	42.1	41.8	0.7	8.0	7.9	1.3
Frontier	430	39.6	35.5	11.5	7.9	6.9	14.5
N. Central	279	46.3	46.3	0.0	8.9	8.7	2.3
Southern	340	41.1	40.8	0.7	7.0	7.8	-10.3

Sources: Calculated from data in Appendices E, G, H and J

[a]Total system scheduled plus charter RPM divided by total system passengers (see footnote 1, Chapter III) yields distance in statute miles.

[b]Calculated from data for the federally-regulated airlines (excluding Northwest) using the equation: $Y = 15.467 + 8,606.848/X$, $R^2 = .935$

[c]Actual percentage deviation from trend value

[d]Calculated from data for the federally-regulated airlines (excluding those with note e) using the equation: $Y = 3.529 + 1,441.314/X$, $R^2 = .801$

[e]Simple average of four carriers paying low benefits (see Table 20)

[f]Payments for the year ended July 31, 1978, divided by the mean RTM for 1977 and 1978

[g]Estimated. Reported combined salaries & wages plus benefits = 36.7 cents.

Salaries and wages. Table 21 and Figure 10 show that a close relationship existed between salaries and wages per RTM and distance among the federally-regulated airlines (excluding Northwest), with the R^2 for the best-fit trend line being .935.[6] It can be seen that Air Canada's low RTM per employee (Table 16) more than offset its low salaries and wages (relative to the U.S. trunk carriers), yielding a payment per RTM that was 12.1 per cent above the trend line. Air Canada's U.S. counterpart, Trans World, had a comparable positive deviation of 11.6 per cent. CP Air's below average RTM per employee and relatively low salaries and wages per employee also combined to yield salaries and wages per RTM that were above the trend line, but by just 5.4 per cent. However, its comparable U.S. carrier, Northwest, had salaries and wages per RTM that were 32.5 per cent below the trend line due to its very high RTM per employee (with roughly average salaries and wages per employee). Most of the remaining federally-regulated airlines were quite close to the trend line. Four of them had deviations of less than one per cent, and four others had deviations ranging from -3.1 to -9.4 per cent. Only Quebecair (-14.2 per cent) and Frontier (11.5 per cent) had absolute deviations exceeding 10 per cent, placing them in the same category as Air Canada and Trans World.

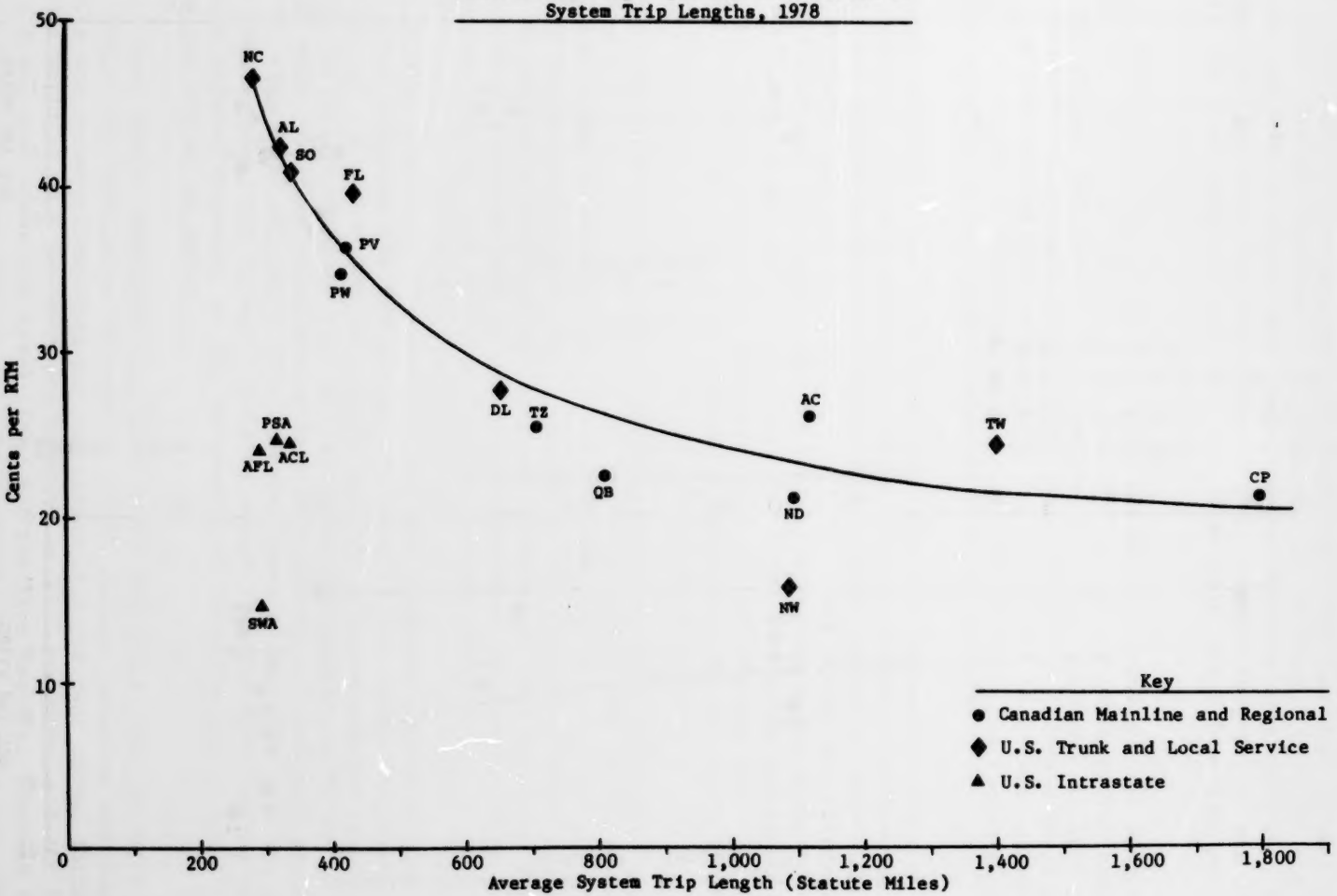
In contrast to the homogeneous federally-regulated airlines, the U.S. intrastate carriers all had salaries and wages per RTM far below the trend line. Not only did Southwest lie -67.1 per cent below the line but, at 14.6 cents, its salaries and wages per RTM were even lower than Northwest's 15.8 cents, despite its system trip length being only 297 miles compared with 1,088 miles for Northwest. Air California, Air Florida and PSA ranged from -41.0 to -46.7 per cent below the trend line, compared with Northwest's -32.5 per cent deviation and the deviations of the other federally-regulated airlines of from -14.2 per cent below to 12.1 per cent above the line. There is no question that the intrastate carriers achieved much lower salaries and wages per RTM than did the federally-regulated airlines, first, by producing more RTM per employee (Table 16) and, second, by paying lower salaries and wages per employee (Table 20).

Benefits. It was shown in Table 20 that the federally-regulated airlines fell into two groups with respect to employee benefits -- one with large benefits per employee ($3,439 to $6,316) and a second with smaller benefits per employee ($1,075 to $2,401). If the federally-regulated airlines with smaller benefits per employee (CP Air, Eastern Provincial, Quebecair and Transair) are examined separately from the other airlines, it can be seen in Figure 11 that they lie around a horizontal line at about 2.3 cents per RTM, with any distance effects being largely balanced by differences in benefits per employee. At the same time, the federally-regulated airlines with large benefits per employee (Air Canada, Nordair, plus the U.S. trunk and local service carriers) lie around a second trend line that decreases with distance and has an R^2 of .801.[7]

The U.S. intrastate carriers again differed from the federally-regulated airlines in that, even though all (except Air Florida) paid relatively large benefits per employee (comparable to those paid by Nordair and Southern, see Table 20), their higher RTM per employee resulted in benefits

Figure 10

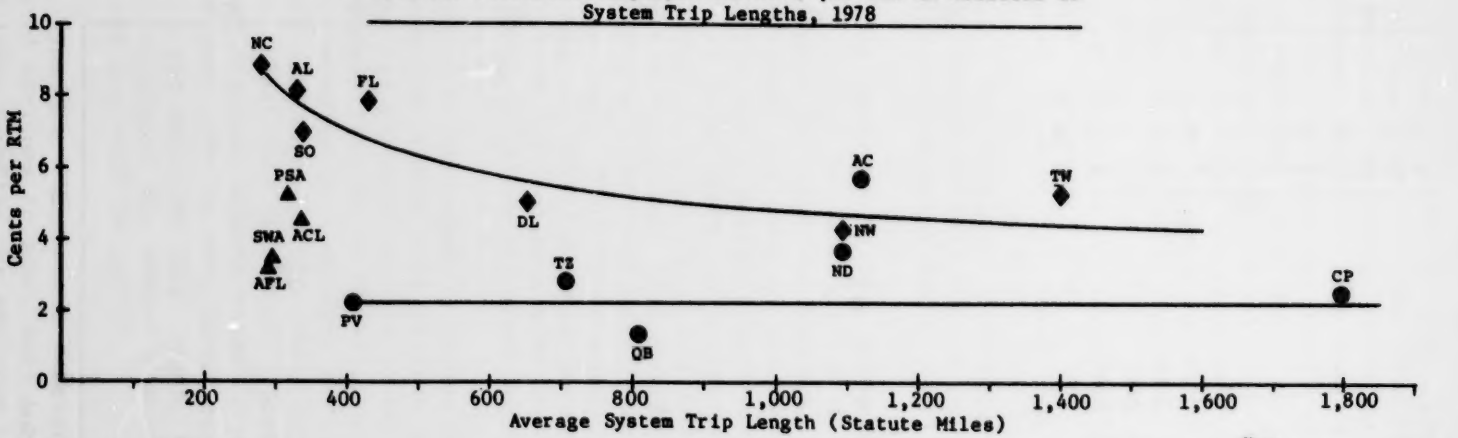
Salaries and Wages per RTM in Relation to System Trip Lengths, 1978



Source: Table 21

Figure 11

Benefits (Insurance-Employee Welfare) per RTM in Relation to System Trip Lengths, 1978



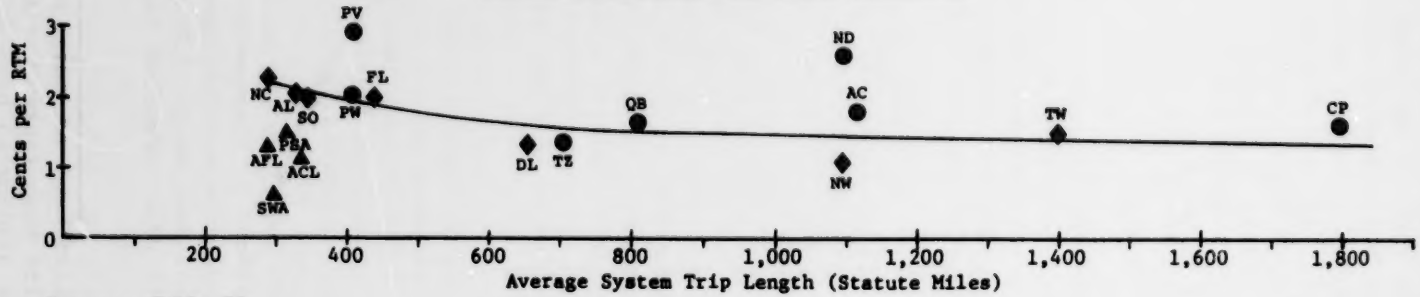
Source: Table 21

Key

- ● Canadian Mainline and Regional
- ◆ U.S. Trunk and Local Service
- ▲ U.S. Intrastate

Figure 12

Personnel Expenses per RTM in Relation to System Trip Lengths, 1978



Source: Table 22

per RTM that were 41.0 to 62.4 per cent below the distance-related trend line. For Air California, PSA and Southwest, this was due primarily to their high RTM per employee. Air Florida, in contrast, achieved its low benefits per RTM by paying small benefits per employee that more than compensated for its lower employee productivity. In that respect, it was similar to the four Canadian carriers that also paid small benefits per employee.

Finally, it may be relevant that Southwest's benefits were high only because of the large contribution in 1978 to its employee profit-sharing plan ($2,297 per employee). Thus, unlike the other airlines, a large part of Southwest's benefit outlay motivated its employees to increase their productivity (as well as service quality). To the extent that this motivation actually occurred, it increased RTM per employee which played a crucial role in decreasing all of Southwest's employee payments per RTM.

Personnel expenses. Table 22 gives the carriers' personnel expenses per RTM, and these data are plotted on Figure 12. A single, distance-related trend line reappears for the federally-regulated airlines, with half of these carriers lying fairly close to the line.[8] Air Canada and CP Air were 20.0 and 21.4 per cent above the trend line, while Trans World was 7.1 per cent above and, as usual, Northwest was -26.7 per cent below the line. The large positive deviations for Eastern Provincial and Nordair (51.9 and 73.3 per cent) are surprising given the small deviations of the other regional carriers.

Continuing with the now familiar pattern, the U.S. intrastate carriers were -28.6 to -72.7 per cent below the trend line, with Southwest still being the lowest of these four carriers (and lower than all of the other carriers regardless of distance). Because of the relatively small absolute sizes of personnel expenses per RTM, the differences look small on Figure 12, but even Northwest was 83 per cent higher than Southwest, while North Central was 283 per cent higher at roughly the same distance.

Grand totals. The three components of employee expenses combine to give the grand total payments per RTM listed in Table 22 and shown in Figure 13. Salaries and wages dominate this total, and the distance-related trend line for the federally-regulated airlines (excluding Northwest) continues to depict a major negative relationship between distance and employee payments per RTM, with an R^2 of .865.[9] This somewhat lower R^2 than the .935 for salaries and wages per RTM is not surprising considering the more limited relationship between distance, on the one hand, and benefits and personnel expenses per RTM on the other.

Once again, Northwest lies well below the trend line at -25.8 per cent, while the cumulative effects of above average salaries and wages, benefits and personnel expenses put Air Canada 18.3 per cent above, followed by Trans World at 16.2 per cent and Frontier at 15.1 per cent. CP Air lies just 2.8 per cent above the trend line, and the five regional carriers fall from -4.2 to -20.4 per cent below. In contrast, the remaining U.S. local

Table 22

Average Personnel Expenses per RTM, Grand Total Payments per RTM and System Trip Lengths
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	System Trip Length[a]	Employee Payments per RTM (Canadian or U.S. Cents)					
		Personnel Expenses			Grand Total		
		Actual	Trend[b]	% Dev.[c]	Actual	Trend[d]	% Dev.[c]
Mainline							
Air Canada	1,116	1.8¢	1.5¢	20.0%	33.6¢	28.4¢	18.3%
CP Air	1,797	1.7	1.4	21.4	25.7	25.0	2.8
Trunk							
Trans World	1,400	1.5	1.4	7.1	30.9	26.6	16.2
Northwest	1,088	1.1	1.5	-26.7	21.3	28.7	-25.8
Delta	652	1.3	1.7	-23.5	34.2	34.9	-2.0
Intrastate							
Air Calif.	334	1.1	2.1	-47.6	30.0	49.8	-39.8
Air Florida[e]	291	1.3	2.2	-40.9	28.5	54.3	-47.5
PSA	320	1.5	2.1	-28.6	31.3	51.2	-38.9
Southwest	297	0.6	2.2	-72.7	18.7	53.6	-65.1
Regional							
East. Prov.	409	2.9	1.9	51.9	41.5	44.2	-6.1
Nordair	1,092	2.6	1.5	73.3	27.4	28.6	-4.2
Pac. Western	406	2.0	1.9	5.3	38.7	44.4	-12.8
Quebecair	806	1.6	1.6	0.0	25.4	31.9	-20.4
Transair	701	1.4	1.6	-12.5	29.8	33.8	-11.8
Local Service							
Allegheny	327	2.1	2.1	0.0	52.2	50.5	3.4
Frontier	430	2.0	1.9	5.3	49.5	43.0	15.1
N. Central	279	2.3	2.2	0.7	57.5	55.9	2.9
Southern	340	2.0	2.0	0.0	50.1	49.3	1.6

Sources: Calculated from data in Appendices E, G, H and J

[a]Total system scheduled plus charter RPM divided by total system passenger (see footnote 1, Chapter III) yields distance in statute miles.

[b]Calculated from data for the federally-regulated airlines (excluding Eastern Provincial and Nordair) using the equation: $Y = 1.236 + 275.299/X$, $R^2 = .609$

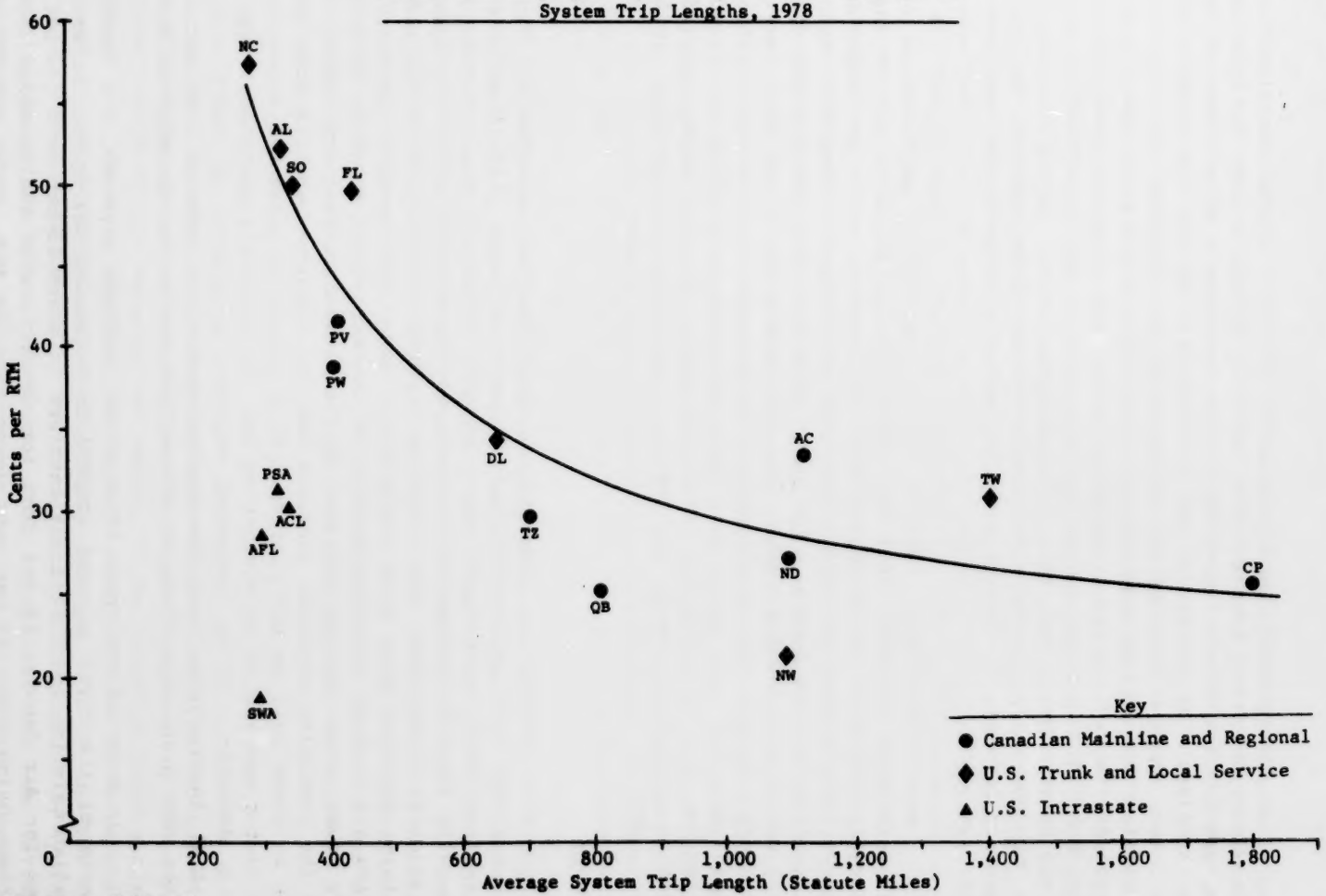
[c]Actual percentage deviation from trend value

[d]Calculated from data for the federally-regulated airlines (excluding Northwest) using the equation: $Y = 19.272 + 10{,}205.857/X$, $R^2 = .865$

[e]Payments for the year ended July 31, 1978, divided by the mean RTM for 1977 and 1978

Figure 13

Grand Total Employee Payments per RTM in Relation to System Trip Lengths, 1978



Source: Table 22

service carriers (other than Frontier) lie just 1.6 to 3.4 per cent above the line.

An intercountry comparison shows that two of the Canadian carriers were above the trend line and five were below, while just the opposite was the case for the federally-regulated U.S. carriers -- five above and two below the line. The pattern is not fully consistent, but the tendency was for the lower average payments per employee of the Canadian carriers to yield somewhat below average payments per RTM, while the higher payments per employee of the U.S. carriers tended to bring them above the line (with Northwest being the notable exception and Delta doing relatively well). It should be remembered that this favourable performance of the Canadian carriers occurred despite the slight bias against these carriers due to their measuring payments to foreign-based employees in Canadian dollars (see footnote 3).

More significant, however, is the impressive performances of the U.S. intrastate carriers. All four had much lower payments per RTM than the federally-regulated airlines due both to lower payments per employee and (except for Air Florida) much higher RTM per employee. Southwest was truly outstanding in this regard. Its grand total employee payments per RTM were -65.1 per cent below the trend line, and were even 12 per cent lower than Northwest's exceptional performance. At the same time, Air California, Air Florida and PSA were -38.9 to -47.5 per cent lower than the trend-line values for the federally-regulated airlines. Clearly, these major differences in employee payments per RTM were important in supporting the intrastate carriers' successful low-fare operations.

Summary

This chapter has demonstrated that Canadian mainline and regional carriers pay their employees about 13 per cent lower average salaries and wages than their counterparts among the U.S. trunk and local service carriers, with the U.S. intrastate carriers having salaries and wages equal to, or slightly lower than, the Canadian regional carriers.[10] Differences in employee benefits were less consistent. Among the Canadian carriers, Air Canada and Nordair had average employee benefits close to those paid by the U.S. trunk, local service and most of the intrastate carriers, while CP Air and the remaining regional carriers had low employee benefits more comparable to those paid by Air Florida. With regard to personnel expenses, the key factor appears to be whether or not the carrier's operations were primarily domestic. If so, personnel expenses were low. If there were substantial international and transborder operations, however, personnel expenses were high, regardless of whether the carrier was Canadian or U.S.

In terms of the grand total of all employee payments, the cumulative effects of the three payment components increased the spread between the Canadian mainline and U.S. trunk carriers to about 15 per cent (11 per cent lower for Air Canada, 19 per cent for CP Air), with the Canadian regional carriers being about 19 per cent lower than the U.S. local service carri-

ers.[11] Again, the U.S. intrastate carriers (except Air Florida) were roughly equal to the Canadian regional carriers.

Fairly consistent patterns were obtained when employee payments per RTM were plotted against system passenger trip lengths and trend lines calculated to indicate the close similarities in these relationships among the federally-regulated airlines in Canada and the United States. The main exceptions were Air Canada, Trans World and Northwest. On the one hand, Air Canada and Trans World had high payments per RTM relative to the trend line for each component. Northwest, on the other hand, had low payments per RTM for each component. Since Air Canada's grand total payments per employee were 13 per cent lower than Northwest's (Table 20), it is clear that major differences in RTM per employee were required to give it payments per RTM 58 per cent higher than Northwest (Table 22). Other carriers that had appreciable deviations from the grand total trend line were Frontier (on the high side), and Pacific Western, Quebecair and Transair (on the low side).

The largest deviations from the trend lines, however, were those of the intrastate carriers. Their truly outstanding performance served to emphasize the fundamental similarity among the federally-regulated airlines. For each component and for grand total payments per employee, the intrastate carriers were 30 to 70 per cent below the trend values of the federally-regulated airlines. Furthermore, the intrastate carriers' employee payments per RTM in short-haul operations were even equal to or lower than federally-regulated airlines having average passenger trip lengths two to five times longer. Southwest's performance was especially outstanding in that for the various components it achieved employee payments per RTM at an average trip length of 297 miles that were superior to even Northwest's at 1,088 miles.

The remarkable similarity between the fares-per-mile data in Figure 1 and the grand total employee payments per RTM in Figure 13 demonstrates that one way the U.S. intrastate carriers were able to be profitable while charging low fares per mile was to have much lower employee costs per RTM. This was achieved by paying their employees lower salaries and somewhat lower personnel expenses (but not benefits), and by producing appreciably more RTM per employee. The former factor was the most important for Air Florida, while the latter played the dominant role for Air California, PSA and Southwest.

Footnotes

1. For both Canadian and U.S. carriers, these three types of payments are identified in the government-designed accounting systems by objective classifications 21-35 for salaries and wages, 57 for benefits (plus classification 68 for the U.S. carriers who report payroll taxes as a separate item), and 36 for personnel expenses [CTC(A) (c), pp. 55, 57 and 60; and CAB (a), pp. 308-10, 314 and 316]. The Canadian and U.S. accounting systems are so similar (often being identical) that it appears one was largely copied from the other. The flight personnel percentages of total personnel expenses were calculated from data given in Appendix J.

2. The time required to summarize the detailed employee payment data by the six employee categories for the 18 carriers made it infeasible to do so for more than one year. Because of stability in employee compensation, however, it seems unlikely that the relative values per employee for the various carriers in 1978 differed appreciably from their 1975-78 averages.

3. It would be desirable to make full exchange rate adjustments for the small numbers of employees located in other countries and paid in foreign currencies. Unfortunately, this information is not available. Therefore, payments to such employees by Canadian carriers measured in Canadian dollars are 14.1 per cent higher than they would be if expressed in U.S. dollars.

4. See Table 6 for areas of operation. Personnel expenses for carriers with large international operations ranged from 4.8 to 9.6 per cent (Trans World and Nordair) of their grand total payments. In contrast, for domestic carriers the range was 3.4 to 5.2 per cent (Southwest and Pacific Western). Delta and the four U.S. local service carriers all had percentages between 3.7 and 4.0. The U.S. intrastate carriers' personnel expenses were low in absolute amounts ($646 for Air Florida to $1,093 for PSA) but, because of equally low grand total payments, their percentages ranged from 3.4 to 4.7.

5. Nordair's high personnel expenses may be caused in part by long crew layovers due to low frequencies to some charter flight destinations.

In a critique of the initial chapters of this study, Mr. J.J. Smith, Assistant to the President of the Air Transport Association of Canada, stated that one reason PSA's costs are low is "simple aircraft routing" whereby "flight and cabin crews are home at night, reducing crew cycle expenses" (1980, p. 2). Data presented in Appendices I and J show that PSA personnel expenses for flying operations and passenger service were $3,032 per crew member compared with $4,618 for Air Canada. As it stands, this would support Mr. Smith's statement, but further calculations show that Delta's personnel expenses per crew member were $3,542 for its large, mainly domestic system. The relatively small difference between PSA and Delta's personnel expenses per crew member indicates that most of the difference between PSA and Air Canada is due to Air Canada's extensive international operations (as discussed in the text) rather than to PSA's flight and cabin crews being at home at night. The fact is, of course, that PSA (as well as Air Canada and all other larger airlines) keep overnight aircraft and crews away from their home bases in order to originate flights in both directions at popular morning hours. They incur personnel expenses accordingly and the size of these expenses is little affected by the crew being 300 miles or 3,000 miles away from home.

6. Based on the lowest mean squared error, the equation for the best-fit trend line is $Y = 15.467 + 8,606.848/X$. The associated R^2 of .935 is significant at the one per cent level (see footnote 3, Chapter III). Note

that including Northwest in the regression yields an R^2 of .905 and trend values slightly lower than those given in Table 21.

7. Based on the lowest mean squared error, the equation for the best-fit trend line is $Y = 3.529 + 1{,}441.314/X$. The associated R^2 of .801 is significant at the one per cent level (see footnote 3, Chapter III).

8. The equation for the trend line having the highest R^2 is: $Y = 1.236 + 275.299/X$. The associated R^2 of .609 is significant at the one per cent level (see footnote 3, Chapter III). The extreme values for Eastern Provincial and Nordair were excluded from this regression.

9. Based on the lowest mean squared error, the equation for the best-fit trend line is $Y = 19.272 + 10{,}205.857/X$. The associated R^2 of .865 is significant at the one per cent level (see footnote 3, Chapter III).

10. The Canadian carriers' salaries and wages could be as much as 20 per cent lower than their U.S. counterparts if exchange rate adjustments are appropriate in these comparisons.

11. Exchange rate adjustments could also increase these differences by as much as seven percentage points.

Chapter VIII

FUEL PRICES

Fuel is a second major component of airline costs, one that has been increasing in importance since 1973.[1] As is true for all inputs, fuel can influence total operating expenses both by changes in prices and by the quantities utilized to produce given levels of output. This chapter will compare the Canadian and U.S. airlines in terms of the prices (including taxes) they pay for fuel. The next chapter will compare them in terms of the outputs they achieve per unit of fuel input.

Relative Importance of Fuel

An idea of the importance of petroleum products relative to total system operating expenses is provided in Table 23 for the 18 carriers analyzed in this study. Table 23 lists the 1978 system operating expenses for fuel and oil plus, where available, the taxes paid in conjunction with the purchase of these products. In addition, it gives system labour expenses as well as total operating expenses for each carrier. Finally, the percentages of total system operating expenses accounted for by petroleum products and by labour are also listed.

Simple means and the medians for the 18 carriers show that, in 1978, petroleum products commonly accounted for just over 21 per cent of total operating expenses, while labour accounted for roughly 39 per cent of total expenses. Thus, together, these two major inputs comprised just over 60 per cent of total operating expenses, with a range of from 50.5 per cent (Air Florida) to 66.8 per cent (Delta). This means that the very large differences that have been identified in total operating expenses per RTM should be reflected to an appreciable degree in these two major categories of inputs since the remaining input categories accounted for between just under half to only about a third of total expenses.[2]

There was a fair degree of homogeneity among the carriers during 1978 in terms of petroleum percentages of total operating expenses. Ten out of the 18 carriers had percentage shares ranging between 20.1 and 23.0 per cent. Of the remaining eight, Air Florida, Southwest, Nordair and Transair had high shares ranging from 24.8 to 28.1 per cent, while Air Canada, Allegheny, Frontier and North Central had low shares ranging from 15.9 to 18.6 per cent. Thus, generally speaking, the two intrastate carriers operating outside of California and the two Canadian regional carriers with extensive far northern routes had high petroleum shares (and low labour shares), while the U.S. local service carriers plus Air Canada had low petroleum shares (and high labour shares).

The modern turbine engine is extremely efficient in its use of oil and, as can be seen in Table 23, oil comprised a minuscule portion of total

Table 23

Petroleum and Labour Shares of Total System Operating Expenses
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	System Operating Expenses (Thousands of Can. or U.S. $)						Per Cent of Total Op. Expenses		
	Petroleum				Labour[a]	Total	Petroleum	Labour	Labour + Petroleum
	Fuel	Oil	Taxes	Subtotal					
Mainline									
Air Canada	229,916	548	n.a.[b]	230,464	541,342	1,238,098	18.6	43.7	62.3
CP Air	39,638	151	n.a.[b]	89,789	168,853	421,985	21.3	40.0	61.3
Trunk									
Trans World	476,175	1,575	8,899	486,649	1,053,509	2,425,659	20.1	43.4	63.5
Northwest[d]	155,887	581	3,091	159,559	234,874	726,424	22.0	32.3	54.3
Delta	416,192	1,555	8,940[e]	426,687	918,223	2,013,216	21.2	45.6	66.8
Intrastate									
Air Calif.	13,898[f]	n.a.	n.a.[f]	n.a.	25,277	63,868	21.8	39.6	61.4
Air Florida[g]	4,175	n.a.[h]	0	n.a.	4,186	16,569	25.2[h]	25.3	50.5
PSA	44,026	191	2,163	46,380	79,562	215,683	21.5	36.9	58.4
Southwest	16,752	86	0	16,838	19,763	59,943	28.1	33.0	61.1
Regional									
East. Prov.	10,015	89	n.a.[b]	10,104	17,932	50,064	20.2	35.8	56.0
Nordair[c]	15,303	45	n.a.[b]	15,348	23,296	61,162	25.1	38.1	63.0
Pac. Western[c]	30,172	226	n.a.[b]	30,398	55,184	132,860	22.9	41.5	64.4
Quebecair[c]	16,565[i]	59[j]	n.a.[b]	16,624	22,153	72,311	23.0	30.6	53.6
Transair	10,032	22	n.a.[b]	10,054	14,027	40,542	24.8	34.6	59.4
Local Service									
Allegheny	94,709	460	1,504	96,673	241,132	532,590	18.1	45.3	63.4
Frontier	41,852	157	1,492	43,501	128,114	274,024	15.9	46.7	62.6
N. Central	43,012	n.a.[k]	1,219	44,231	120,249	263,748	16.8	45.6	62.4
Southern	35,597	124	1,113	36,834	77,316	180,808	20.4	42.8	63.2

Sources: Appendices C and J; Air California (c), June 9, 1978, Appendix A and Dec. 28, 1978, Appendix A; CAB (e); Peat, Marwick, Mitchell & Co., "1978"; PSA (k); Southwest (h), Schedules E-1 and F; SC(ASC) (b), Table 4

Telephone conversations with the specified individuals at the following carriers:
Delta, J. Gwin, Comptroller, Oct. 28, 1980;
Frontier, R. Uhrich, Manager -- Gen. Acctg., Oct. 17, 1980);
Northwest, K. Johnson, Director -- Cost Acctg., Oct. 22, 1980;
Republic, M. Myers, Vice President & Controller, Oct. 17, 1980;
Southwest, Mr. McCord, Maintenance, Aug. 17, 1979;
Trans World, E. Ashburn, Director -- Gen. Acctg., Oct. 9, 1980; and
U.S. Air, S. Hoerdegen, Director -- Accts. Payable, Oct. 21, 1980.

[a]Total salaries and wages, employee benefits, and personnel expenses. Also, see note a to Table J.1.

[b]Non-refundable provincial and other fuel taxes are not reported separately by Canadian carriers but are included in total fuel and oil expenditures.

[c]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[d]Northwest's three-and-a-half-month strike during 1978 reduced absolute expenditures on labour and petroleum with a possible related reduction in percentage shares of total operating expenses. However, 1977 data show labour's share was 31.4 per cent in 1977 vs. 32.3 per cent in 1978 (contrary to expectations), while petroleum's share was 25.4 per cent in 1977 vs. 22.0 per cent in 1978 (a consistent, but relatively small, effect).

[e]Estimated based on Delta's practice of using 2.14 per cent of fuel and oil costs to derive taxes for budgetary purposes. Delta does not disclose actual data to the public that are more detailed than those submitted to the CAB.

[f]Estimated from actual experience for the first ten months of 1978. Probably includes oil expenses, the five per cent state sales tax and airport fees.

[g]Fiscal year ending July 31, 1978

[h]Detailed audit working papers did not list any expenditures for oil products during fiscal year 1978. Thus, oil is probably included in fuel expenditures.

[i]Includes $456,000 of aviation gasoline for piston aircraft

[j]Includes $3,000 of other oil for piston aircraft

[k]Starting in 1977, North Central reported oil and fuel as a combined expenditure. In both 1975 and 1976 reported oil expenditures were just over $39,000.

petroleum costs in 1978. In just three cases (Southwest, Eastern Provincial and Pacific Western) did it account for as much as one-half of one per cent of total petroleum expenses, and North Central didn't even bother to report it separately from its fuel costs (thereby slightly inflating its fuel prices since the price of oil per litre is about 20 times the price of turbine fuel). Therefore, since fuel is the only significant component of petroleum costs among airlines operating turbine-powered aircraft, the remainder of this chapter and the next will deal exclusively with fuel prices and utilization.

Intracountry Comparisons

The 18 carriers' domestic and system fuel prices (including taxes and fuel-related airport fees)[3] are presented in Table 24 for each year from 1975 to 1978. The prices are given in cents per litre to avoid any confusion between the Imperial gallon used in Canada and the smaller U.S. gallon.[4] In addition, the data are limited to turbine fuel used in turbojet and turboprop aircraft.[5] No allowance is made, however, for differences in the qualities of turbine fuel used by the various carriers. For example, between 1975 and 1976, Air Canada changed from using primarily grade B turbine fuel to the higher-priced grade A-1 fuel.[6]

Looking first at the mean (weighted average) system fuel prices for each carrier group, there was a high degree of similarity among the U.S. groups. The average prices paid by the local service carriers were generally about one per cent more than those paid by the trunk carriers (except for 1975 when the local service carriers' average was less than the average of the trunk carriers). During the same years, the intrastate carriers paid about two per cent more than the trunk carriers. This similarity in prices was, however, due in part to the effects of higher-priced international fuel on the system prices of the trunk carriers. A comparison of the domestic fuel prices shows that the local service carriers paid about three per cent more than the trunk carriers, while the intrastate carriers paid about four per cent higher prices. Overall, it seems fair to conclude that during these four years the differences in fuel prices paid by all three groups of U.S. carriers were small and, at most, could account for only a minor portion of differences in total operating expenses per RTM. Indeed, Figure 4 shows that the U.S. carriers having the lowest total operating expenses per RTM, after adjusting for distance, were the intrastate carriers plus Northwest. Since these were among those who paid slightly higher fuel prices, it follows that fuel prices were not a factor in their favourable cost performances.

The same similarity in fuel prices did not exist between the two groups of Canadian carriers. The means for the regional carriers' system fuel prices were from 6.8 to 10.0 per cent higher than those of the mainline carriers, and there was also considerable variation within each of the two groups. CP Air, for example, paid up to 10 per cent more for fuel than Air Canada (in 1975), while Nordair generally had the highest fuel prices among the regional carriers, followed by Eastern Provincial (1975-76) or Pacific

Table 24

Domestic and System Fuel Prices
Canadian Mainline, Regional and Selected U.S. Carriers, 1975-78

Carrier	Turbine Fuel Prices[a] (Canadian or U.S. Cents per Litre)							
	Domestic[b]				System			
	1975	1976	1977	1978	1975	1976	1977	1978
Mainline								
Air Canada	8.409[c]	10.218[c]	11.625[c]	12.844[c]	8.932	10.239	11.645	12.888
CP Air	9.713[c]	10.855[c]	11.839[c]	13.329[c]	9.834	10.629	11.632	13.376
Mean[d]	8.739[c]	10.376[c]	11.678[c]	12.968[c]	9.176	10.343	11.642	13.022
Trunk								
Trans World	7.895	8.262	9.801	10.496	8.447	8.743	9.898	10.731
Northwest	8.190	8.612	9.895	10.501	8.441	8.871	9.985	10.713
Delta	7.656	8.295	9.569	10.293	7.706	8.327	9.594	10.309
Mean[d]	7.862	8.350	9.725	10.399	8.199	8.630	9.900	10.557
Intrastate								
Air Calif.	Same as System				n.a.	n.a.	n.a.	11.719[e]
Air Florida	" " "				n.a.	n.a.	n.a.	10.750[f]
PSA	" " "				8.177	8.898	10.195	10.854
Southwest	" " "				8.198	8.335	9.820	10.244
Mean[d]					8.180	8.813	10.114	10.684[g]
Regional								
East. Prov.	10.594[c]	11.458[c]	12.494[c]	13.305[c]	10.353	11.209	12.365	13.239
Nordair	11.357[c]	12.142[c]	13.963[c]	15.052[c]	11.075	11.703	13.364	14.559
Pac. Western	9.815[c]	10.886[c]	13.297[c]	14.828[c]	9.875	10.796	13.066	14.601
Quebecair	9.741[c]	11.018[c]	12.818[c]	14.110[c]	10.046	11.003	12.688	13.966
Transair	9.046[c]	10.534[c]	11.660[c]	13.423[c]	9.212	10.538	11.655	13.368
Mean[d]	10.063[c]	11.179[c]	12.990[c]	14.317[c]	10.095	11.042	12.783	14.128
Local Service								
Allegheny	Same as System				7.421	8.734	9.967	10.639
Frontier	" " "				7.810	8.886	9.958	10.898
N. Central	" " "				8.390	8.764	10.078	10.920
Southern	" " "				7.409	8.449	9.791	10.365
Mean[d]					7.653	8.718	9.957	10.697

Sources: Same as Table 23 plus Air Florida (g) and (h); Appendix K; The First Boston Corp., 1980, pp. 7 and 16

[a]Turbine fuel including taxes and fuel-related airport fees

[b]Includes transborder operations for U.S. carriers

[c]Estimated (see Appendix K)

[d]Weighted average (total fuel expenses divided by total litres purchased)

[e]Partially estimated. May be somewhat larger than actual.

[f]Fiscal year ended July 31, 1978

[g]Excludes Air California and Air Florida

Western (in 1977, with virtual equality in 1978). The differences were even greater for estimated domestic fuel prices. These data indicate that mean domestic fuel prices paid by the regional carriers ranged between 7.7 to 15.1 per cent higher than the prices paid by the mainline carriers. These larger differences may reflect the higher prices paid by several of the regional carriers for fuel at remote points in the far north. Regardless of the reasons, however, fuel price differences of up to 15 per cent are large enough to account for some of the differences in total operating expenses per RTM among Canadian carriers. But there is again the inconsistency that carriers paying higher fuel prices (CP Air, Nordair and Pacific Western) had lower total operating expenses per RTM (after adjusting for the distance) than Air Canada, the carrier with the lowest system fuel prices (see Table 5).

Intercountry Comparisons

Although the differences among Canadian carriers were fairly large, even larger differences appear to have existed between carriers in Canada and comparable U.S. carriers. Before making these intercountry comparisons, however, some adjustment must be made for differences in exchange rates -- not necessarily for domestic fuel purchased by each carrier within its own country, but for fuel purchased by each carrier in other countries for transborder or international operations. Obviously, if a Canadian carrier and a U.S. carrier purchased the identical types of fuel at identical prices in the same foreign country, the dollar prices reported by the two carriers would differ if the Canadian and U.S. dollars were not trading at par. It happens that the exchange rates were essentially at par in 1975 and 1976 (1.017 Canadian dollars equaled one U.S. dollar in 1975, while 0.986 Canadian dollars equaled one U.S. dollar in 1976), but in 1977 and 1978 the Canadian dollar decreased in value relative to the U.S. dollar (1.063 and 1.141 Canadian dollars equaled one U.S. dollar in 1977 and 1978, respectively) (Finance Canada, April 1980, p. 261).

Precise adjustments for 1975-78 exchange rate differences cannot be made because the carriers do not report fuel expenditures by place of purchase. Even the U.S. carriers' breakdown by domestic (including transborder) and international operations is inadequate because of the appreciable shares of fuel utilized in international operations that were actually purchased domestically for outbound flights. However, this reporting deficiency does not eliminate the need to obtain a rough estimate of the extent to which differences in exchange rates do affect system fuel prices of Canadian and U.S. carriers. Without such an estimate, intercountry comparisons of average system fuel prices would be suspect.

Since the U.S. dollar is the major international currency, it was decided to leave the U.S. carriers' fuel expenditures unadjusted and to limit the exchange rate adjustments to estimating U.S. dollar prices for fuel purchased by Canadian carriers in foreign countries (including the United States). This was done by using the Canadian carriers' plane-mile data by area of operation, average system fuel consumption per plane-mile,

and system fuel expenditures, in conjunction with relevant fuel price and consumption data for U.S. carriers. The details of how these estimates were calculated are given in Appendix K. Implicit in the procedure is the assumption that domestic fuel expenditures by Canadian and U.S. carriers in their respective countries can be compared without exchange rate adjustments (see Appendix B). This assumption is clearly correct for 1975-76 due to the small differences in the value of the two currencies for those two years. Furthermore, the basic consistency between the estimates for 1975-76 and those for 1977-78 indicate that the assumption is also correct for these two later years.

Table 25 summarizes the 1975-79 estimated fuel prices per litre for Canadian carriers after making the exchange rate adjustments. Comparing these prices with the Canadian carriers' unadjusted prices in Table 24 brings out the fact that the exchange rate differences had only minor effects on average fuel prices for these carriers. As is also shown in Table 25, the largest exchange rate adjustments (for 1978) resulted in reductions in average Canadian fuel prices of from 0.7 per cent (Eastern Provincial) to 3.7 per cent (CP Air). The reason why these reductions were so small is that the Canadian carriers actually purchased most of their total system fuel within Canada. The proportion purchased domestically ranged from an estimated 70 per cent (CP Air) to 94 per cent (Eastern Provincial), with the average for all seven mainline and regional carriers as a group being about 77 per cent (see Appendix K).

A comparison between the adjusted system fuel prices for Canadian carriers in Table 25 and the system fuel prices of the U.S. carriers given in Table 24 shows that the Canadian carriers consistently paid more than the comparable U.S. carriers during 1975-78. These percentage differences are summarized in Table 26. Air Canada paid prices that were roughly 17 per cent higher than those paid by Trans World (except for 1975 when Air Canada used large amounts of grade B fuel). During the same period, CP Air's fuel prices fluctuated between 15 and 20 per cent above those of Northwest. The differences were even greater for the five regional carriers in relation to the weighted average for the three local service carriers that operated mainly in northern areas of the United States. They ranged from 15.8 to 43.4 per cent higher, with a simple average for the four years of 27.4 per cent. Given the similarities in system fuel prices among the three U.S. carrier groups, it follows that the percentages given in Table 26 also indicate the differences between the system fuel prices of the Canadian carriers and the average for the U.S. intrastate carriers.

While the reality of the higher system fuel prices paid by Canadian carriers is the important factor in intercountry cost comparisons, it remains desirable to determine why these differences existed in 1975-78. Since there is no reason to believe Canadian carriers paid more than U.S. carriers for fuel purchased in foreign countries served in common, the differences are probably to be found in domestic fuel purchases. There appear to be two main reasons for domestic price differences. First, higher taxes and fuel-related airport fees were assessed in Canada than in the United

Table 25

System Fuel Prices per Litre After Exchange Rate Adjustments
Canadian Mainline and Regional Carriers, 1975-78

Carrier	Fuel Prices in Cents per Litre Adjusted for Exchange Rates				Adjusted Fuel Prices Per Cent of Unadjusted Prices			
	1975	1976	1977	1978	1975	1976	1977	1978
Mainline								
Air Canada	8.893	10.271	11.504	12.521	99.6	100.3	98.8	97.2
CP Air	9.785	10.670	11.434	12.884	99.5	100.4	98.3	96.3
Regional								
East. Prov.	10.341	11.220	12.321	13.142	99.9	100.1	99.6	99.3
Nordair	11.038	11.740	13.185	14.142	99.7	100.3	98.7	97.1
Pac. Western	9.854	10.816	12.961	14.386	99.8	100.2	99.2	98.5
Quebecair	10.003	11.035	12.511	13.565	99.6	100.3	98.6	97.1
Transair	9.191	10.559	11.573	13.185	99.8	100.2	99.3	98.6

Sources: Appendix K and Table 24

Table 26

Canadian Carriers' System Fuel Prices After Exchange Rate Adjustments as Percentage of System Fuel Prices of Comparable U.S. Carriers, 1975-78

Carrier		Canadian Adjusted Fuel Prices % Greater than U.S. Prices			
Canadian	Comparable U.S.	1975	1976	1977	1978
Mainline					
Air Canada	Trans World	5.3	17.5	16.2	16.7
CP Air	Northwest	15.9	20.3	14.5	20.3
Regional					
East. Prov.	Local Service[a]	34.3	27.9	23.3	22.1
Nordair	" "	43.4	33.8	32.0	31.4
Pac. Western	" "	28.0	23.3	29.7	33.6
Quebecair	" "	29.9	25.8	25.2	26.0
Transair	" "	19.4	20.4	15.8	22.5

Sources: Appendix K and Tables 24 and 25

[a]Weighted average of Allegheny, Frontier and North Central

States. Second, an additional part of the large differences between Canadian regional and U.S. local service carriers appears to be due to the extensive operations of the regional carriers to remote points in the far north, while the local service carriers' operations were essentially limited to the 48 contiguous states where the logistics of supply have always been much less difficult and costly.

Canada assessed a 12 per cent sales tax on the retail value (including airport fees) of fuel used in domestic operations until November 17, 1978, when the tax was reduced to nine per cent. During these years, the United States did not have a federal sales tax on turbine fuel.[7] Provincial fuel taxes in Canada were also appreciably higher on average than state fuel taxes in the United States. While Newfoundland and P.E.I. did not assess fuel taxes, Alberta, New Brunswick, Nova Scotia, Ontario and Quebec charged 0.66 cents per litre; British Columbia and Manitoba charged 1.10 cents per litre; and Saskatchewan had a tax of 1.32 cents per litre in 1977-78 (increased from .88 cents per litre in 1975-76). In contrast, 31 states (62 per cent) in the United States did not tax turbine fuel and the tax rates among the remaining 19 states ranged up to 1.057 cents per litre (ibid.).

With regard to fuel-related airport fees, all airports operated by Transport Canada charged a 0.33-cent per litre fee for all turbine fuel delivered to aircraft. In the United States there was considerable diversity among the locally operated airports with regard to such fees. Data available for PSA and Southwest indicate that an average airport fee of 0.15 cents per litre existed in California and 0.25 cents per litre in Texas,[8] but these averages doubtless overstate the fees paid by the larger CAB-regulated airlines which often have special fueling arrangements at their major airports. An estimate of 0.10 cents per litre would probably more closely approximate the average airport fees paid by these carriers.

Appendix L shows the calculations used to estimate the net domestic fuel prices paid by Canadian and U.S. carriers after deleting the federal sales tax, provincial/state taxes and fuel-related airport fees. While these figures are partially estimated, any errors are likely to be small, and it is believed that these calculations provide a fairly accurate indication of the <u>relative</u> domestic prices actually paid to fuel suppliers in the two countries. The percentage differences between the net prices paid by Canadian and comparable U.S. carriers are summarized in Table 27. The differences between Air Canada and Trans World ranged from -15.3 per cent (for 1975) to 4.2 per cent. Thus, except for 1975, it appears that the net prices of these two carriers were very similar. The differences between CP Air and Northwest for these years were also fairly small, ranging from -3.2 to 8.3 per cent. Generally speaking, net fuel prices paid by Canadian mainline carriers to their domestic suppliers were seldom more than five per cent greater than the net prices paid by comparable U.S. trunk carriers, and they were sometimes less.

The pattern is appreciably different for the Canadian regional carriers. Table 27 shows that, with the exception of Transair, the net domes-

tic fuel prices paid by these carriers generally exceeded the average for the three northern U.S. local service carriers by three per cent or more, with Nordair being 17.1 to 24.2 per cent higher than the three northern local service carriers. Given the similarities among the mainline and trunk carriers in the two countries, it seems likely that these larger percentage differences for the regional carriers reflect the higher prices they paid for fuel in the far north. Unfortunately, detailed data are not available to allow this matter to be pursued further.

Table 27

Domestic Fuel Prices Net of Taxes and Airport Fees
Canadian Mainline and Regional Carriers
Per Cent Different than Comparable U.S. Carriers, 1975-78

Carrier		Canadian Carrier % Different than Comparable U.S. Carrier			
Canadian	Comparable U.S.	1975	1976	1977	1978
Mainline					
Air Canada	Trans World	-15.3	2.4	-0.1	4.2
CP Air	Northwest	-3.2	5.2	0.9	8.3
Regional					
East. Prov.	Local Service[a]	18.9	13.4	8.9	8.4
Nordair	" "	24.2	17.1	19.5	20.6
Pac. Western	" "	3.0	1.6	11.3	16.7
Quebecair	" "	4.7	5.3	8.9	12.5
Transair	" "	-6.3	-2.1	-4.2	4.7

Source: Calculated from data in Appendix L

[a]Weighted average of Allegheny, Frontier and North Central

Summary

In the United States, the trunk, local service and intrastate carriers generally paid systemwide prices for turbine fuel that were within two per cent of each other (see Table 24). In Canada, while the two mainline carriers paid similar systemwide fuel prices, the regional carriers paid seven to ten per cent more for their fuel than the mainline carriers. The differences in domestic fuel prices were somewhat larger -- generally under five per cent in the United States and between eight to 15 per cent in Canada.

In contrast, there were significant differences in the average fuel prices paid systemwide by the carriers in Canada as opposed to those in the United States. The two Canadian mainline carriers paid 15 to 20 per cent more for fuel systemwide than comparable U.S. trunk carriers (after exchange rate adjustments), while the regional carriers usually paid from 20 to 35

per cent higher system prices than the average of comparable U.S. local service carriers (see Table 26).

The differences in domestic fuel prices between the two countries were not the result of Canadian suppliers charging appreciably higher prices for fuel per se. Rather, they appear to be mainly due to two factors: first, the much higher taxes and fuel-related airport fees charged by the Canadian federal and provincial governments in relation to those charged in the United States (see Appendix L); second, for the regional carriers, the much higher prices that were probably paid to obtain fuel in remote regions of the country where the costs of delivering and storing fuel are substantially greater than in major population centres. Domestic prices net of taxes and airport fees paid by the Canadian mainline carriers for fuel delivered primarily at major airports were generally within five per cent of those paid by U.S. trunk carriers (see Table 27). Therefore, they were almost equal to the net prices paid by the U.S. intrastate carriers. The same was also true for Transair and, in 1975-76, for Pacific Western and Quebecair relative to the U.S. local service carriers.

The policy implication regarding the effects of taxes and airport fees on airline costs is that it would have been relatively easy (but costly) for the federal and provincial governments to eliminate all or a large part of the fuel price disadvantage under which the Canadian carriers operated during 1975-78 relative to comparable U.S. carriers. All they would have had to do was to reduce their relatively high fuel taxes and airport fees down to U.S. levels.

Footnotes

1. Increases in fuel prices have been especially large in the United States since the termination of price controls (over turbine fuel) on February 25, 1979. Between December 1978 and June 1980, the average fuel price for the system operations of the U.S. trunk carriers increased 128.8 per cent, from 10.514 to 24.053 cents per litre. During the same time period, the average fuel price for the system operations of the Canadian mainline carriers increased 55.9 per cent, from 12.444 to 20.959 cents per litre [CAB (h), Dec. 1978 and June 1980; PSA (a), 1979, p. 7; SC(ASC), phone conversations with J. Bekooy, Oct. 27 and 28, 1980].

2. There are limitations to comparing percentage shares of total operating expenses. First, such percentages do not indicate the relative sizes of operating expenses since the percentage distributions for low-cost carriers like Northwest and Southwest will have the same 100 per cent total as high-cost carriers such as Trans World and Eastern Provincial. Second, carriers having low percentage shares in one category must necessarily have high shares in one or more other categories in order to make up the 100 per cent total (note Air Florida and Southwest's low labour shares and high petroleum shares compared with Air Canada's high labour share and low petroleum share). Percentage shares do identify, however, areas where carriers may be out of line with general performance and, therefore, may provide insights into why they are doing well or poorly relative to the overall norm.

3. Published fuel data for Canadian carriers include the federal sales tax, non-refundable provincial fuel taxes and fuel concession payments at airports [CTC(A) (c), pp. 58 and 61]. There is no federal sales tax on turbine fuel in the United States, and state fuel taxes are reported as part of taxes -- other than payroll [CAB (a), pp. 313 and 316]. Transport Canada charges an airport fee (concession payment) of 1.5 cents per gallon (0.330 cents per litre) for all turbine fuel delivered to aircraft at the airports it operates. This includes virtually every major airport in Canada [Transport Canada (a)]. Similar fuel-related airport fees are assessed at some U.S. airports, but there is a wide diversity in charges since U.S. airports are generally owned and operated by local agencies.

4. The Imperial gallon is about 20 per cent larger than the U.S. gallon. The conversion factors used in this study are: one Imperial gallon equals 4.546090 litres, while one U.S. gallon equals 3.7854118 litres.

5. Small quantities of gasoline were used in piston-powered aircraft by Eastern Provincial (1975-76), Nordair (1975-76), Quebecair (1975-78) and Southern (1975-78). Quebecair's peak use of gasoline during this period was 2.4 per cent of total fuel (in 1976), while Southern's peak was 4.9 per cent (in 1975). To the extent possible, all operating data for piston-powered aircraft and for gasoline have been excluded from this and subsequent analyses [CAB (e) and SC(ASC) (b), Table 4].

6. U.S. carriers generally used grade A-1 fuel during this entire period. As of late 1980, about ten per cent of Air Canada's total fuel was still grade B (telephone conversation with Mr. Edward Lloyd, Purchasing Agent, Air Canada, Oct. 30, 1980). Grade A-1 fuel is priced about .418 cents per litre more than grade B fuel (letter from Mr. R. Ward, Marketing Department, Imperial Oil Ltd., Dec. 1, 1980).

7. Letter from Mr. R. Ward, Marketing Department, Imperial Oil Ltd., Dec. 1, 1980; CAB (p), Nov. 1979, p. 155.

8. Ward, ibid.; see also PSA (k); Southwest (h), Schedules E-1 and F.

Chapter IX

FUEL UTILIZATION AND EXPENSES

In addition to differences between carriers in fuel prices and taxes, it is also possible for differences to exist in fuel utilization. Two measures of fuel utilization are available ton-miles (ATM) per litre and revenue ton-miles (RTM) per litre. The former measures aircraft output per unit of fuel input, the latter the combined output per litre of fuel of both aircraft and the carrier's traffic generating activities. RTM per litre is the more relevant measure of fuel utilization because flying empty aircraft over a route system has little economic value even though it produces the same ATM as flying aircraft full of revenue traffic. A carrier could select fuel-efficient aircraft, schedule them primarily on long-haul flights and operate them at relatively low cruising speeds, thereby minimizing fuel consumption per ATM. However, if these aircraft are unattractive to passengers, if they are operated between city pairs where there is little traffic, and if the low speeds divert passengers to other carriers, fuel efficiencies in aircraft operations could be lost by the associated inefficiencies in generating traffic, thereby yielding low load factors and low RTM per litre. Load factors (and RTM per litre) can also be influenced by other considerations such as: the proportion of a route system where a carrier provides monopoly service, fare and cost levels which affect breakeven (and therefore actual) load factors, and so on (Douglas and Miller, 1974, pp. 80-103).[1]

Average aircraft stage length (aircraft miles flown divided by the number of departures performed) is another relevant factor affecting fuel utilization. The quantity of fuel consumed while taxiing is little affected by distance flown, and fuel consumption is greater during takeoff and climb than during enroute cruising. Thus, airlines with long average stage lengths should have greater ATM and RTM per litre than carriers with shorter average stage lengths which must spend relatively more fuel taxiing, taking off and climbing. Since carriers differ with regard to average stage length and since this factor may be largely beyond their control (often due to regulatory constraints), it is desirable to remove the effects of distance when comparing the fuel utilization of the various carriers. This can be done through the use of regression analysis, as in the previous chapters when dealing with operating expenses per RTM and with employee utilization and expenses per RTM.

Output per Litre

Table 28 summarizes the average ATM per litre and average RTM per litre for the 18 carriers during the four-year period from 1975 through 1978. These measures of fuel utilization are then plotted on Figures 14 and 15 in relation to average system stage length (also given in Table 28). As expected, the figures show a significant positive relationship between dis-

Table 28

Fuel Utilization and Average System Stage Length
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	Avg. Sys. Stage Length[a]	Fuel Utilization					
		ATM per Litre			RTM per Litre		
		Actual	Trend[b]	% Dev.[c]	Actual	Trend[d]	% Dev.[c]
Mainline							
Air Canada	633	1.696[e]	1.451	16.9%	.819	.733	11.7%
CP Air	960	1.675[e]	1.664	0.7	.879	.833	5.5
Trunk							
Trans World	921	1.430	1.642	-12.9	.698	.823	-15.2
Northwest	654	1.691	1.467	15.3	.712	.740	-3.8
Delta	447	1.220	1.294	-5.7	.601	.658	-8.7
Intrastate							
Air Calif.	235[f]	1.161[f,g]	1.048	10.8	.711[f]	.539	31.9
Air Florida	221[h]	.864[g,h]	1.027	-15.9	.410[f]	.529	-22.5
PSA	271	1.210[g]	1.098	10.2	.591	.564	4.8
Southwest	252	1.336[g]	1.072	24.6	.637	.551	15.6
Regional							
East. Prov.	244	.870[i]	1.061	-18.0	.530	.546	-2.9
Nordair	478	n.a.[i]	-	-	.751	.672	11.8
Pac. Western	272	1.103[i]	1.099	0.4	.703	.564	18.5
Quebecair	320	n.a.[i]	-	-	.709	.593	19.6
Transair	425	n.a.[i]	-	-	.593	.648	-8.5
Local Service							
Allegheny	238	.934	1.052	-11.2	.472	.542	-12.9
Frontier	211	1.218	1.011	20.5	.618	.522	18.4
N. Central	144	1.022	.892	14.6	.447	.464	-3.7
Southern	211	.900	1.011	-11.0	.404	.522	-22.6

Sources: Same as Tables 23 and 24; Appendix E; Air Florida (b), Schedule A-1; CAB (c), 1980, (d), p. 70, (p), 1977 and 1979; Eastern Provincial, 1978, p. 15; PSA (g); Southwest (a), 1978, p. 8; SC(ASC) (1), Table 5, (p), (q) and (u), Table 1

[a]Total system revenue aircraft miles flown divided by number of revenue departures performed yields stage length in statute miles.

[b]Calculated from data for the federally-regulated airlines (excluding Nordair, Quebecair and Transair) using the equation: $\text{Log } Y = \text{Log } .174 + .329 \text{ Log } X$, $R^2 = .716$

[c]Actual percentage of trend value

[d]Calculated from data for the federally-regulated airlines using the equation: $\text{Log } Y = \text{Log } .100 + .309 \text{ Log } X$, $R^2 = .615$

[e]Total ATM was partially estimated by summing actual scheduled ATM + passenger charter RTM divided by international passenger charter load factors + cargo charter RTM (assuming 100 per cent load factors for cargo charters). CP Air had no cargo charters and Eastern Provincial's cargo charters were negligible.

[f]Year ended December 31, 1978

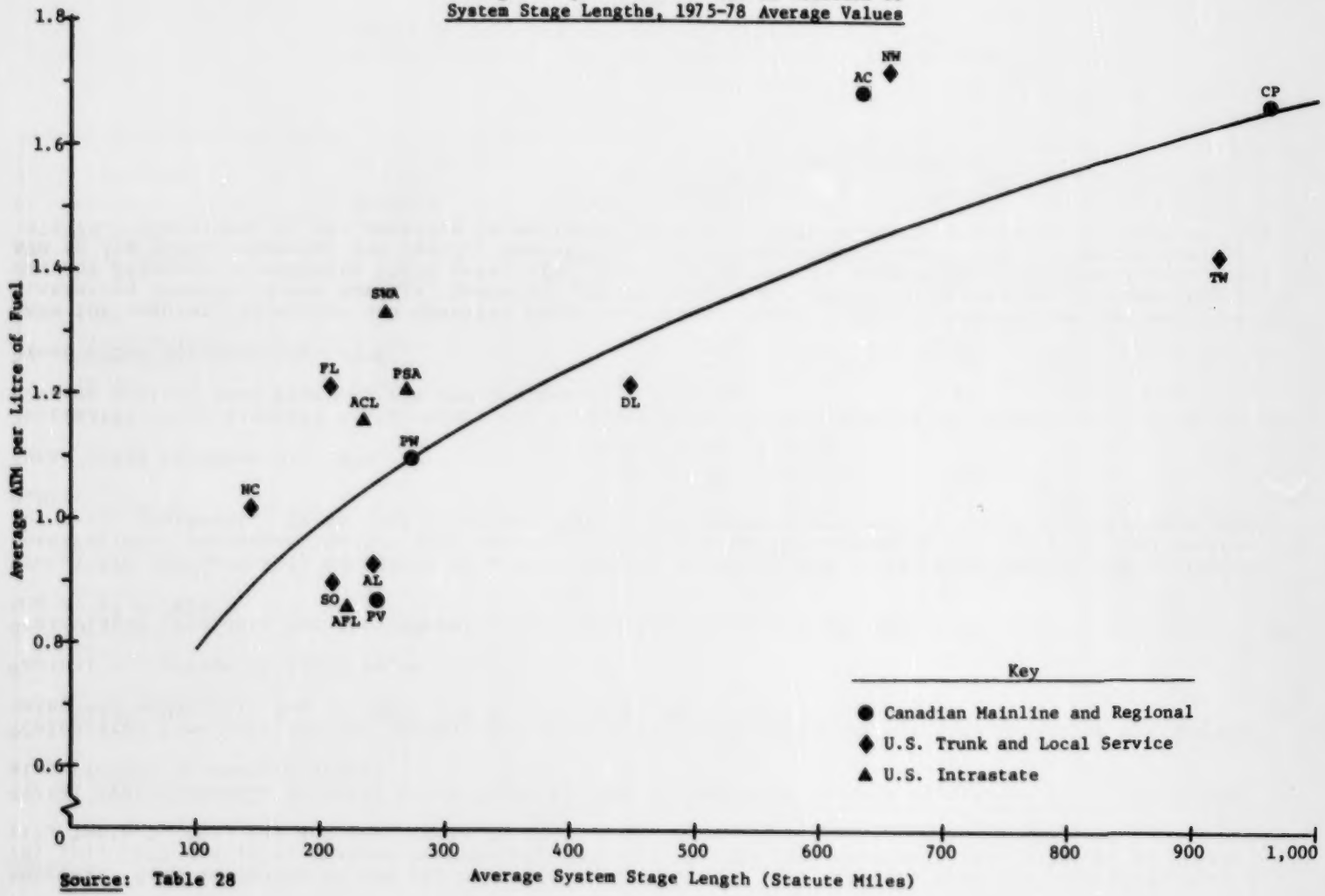
[g]Estimated using aircraft flight-hours and tons per hour (Air California) or revenue aircraft-miles and average payload (Air Florida, PSA and Southwest)

[h]Year ended September 30, 1978

[i]ATM for regular, irregular and specific point operations (class 2 and 3 licences) are not reported to Statistics Canada. Since Nordair, Quebecair and Transair had substantial operations of these types, it was not possible to estimate their total ATM. However, Eastern Provincial publishes total unit total ATM in its annual reports, and Pacific Western did not operate under class 2 and 3 licences during 1975-78. Therefore, it was possible to estimate their total ATM using the procedure outlined in note e.

Figure 14

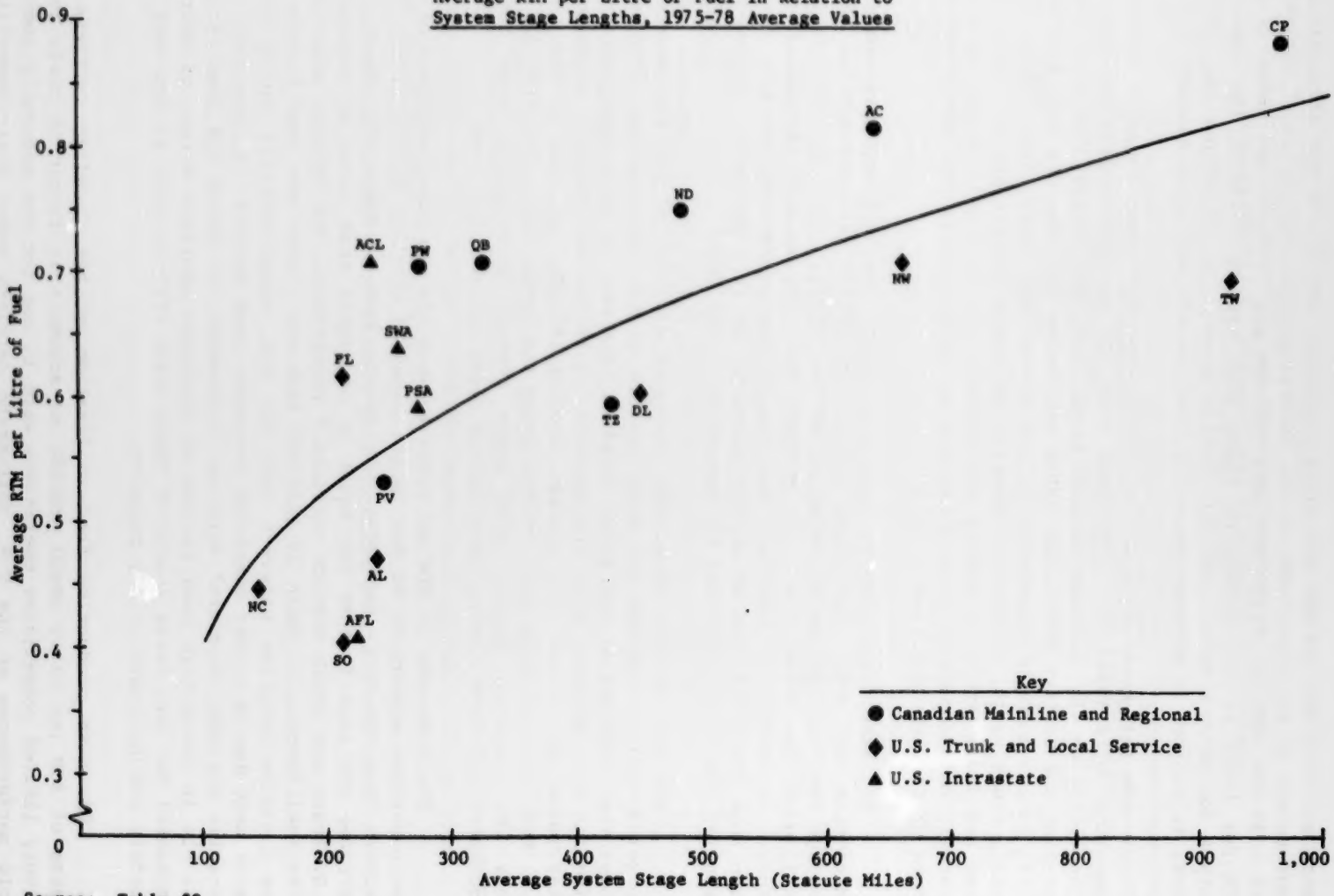
Average ATM per Litre of Fuel in Relation to System Stage Lengths, 1975-78 Average Values



Source: Table 28

Figure 15

Average RTM per Litre of Fuel in Relation to System Stage Lengths, 1975-78 Average Values



Source: Table 28

tance and both ATM and RTM per litre. Indeed, the R^2 for the straight-line regressions of the logarithms of the federally-regulated airlines' variables are .716 for ATM per litre and .615 for RTM per litre.[2] The lower R^2 for RTM per litre is not surprising since this measure reflects the combined output for both aircraft and for traffic generating activities and, therefore, is subject to greater variation than the ATM per litre measure.

ATM per litre data are available for just four Canadian carriers (see note i to Table 28). Of these four, CP Air and Pacific Western lie essentially on the distance-related trend line, Air Canada lies well above the line and Eastern Provincial falls well below it. The CAB-regulated airlines have a similar dispersion on and around the trend line. Delta lies fairly close to it, Northwest, Frontier and North Central are well above the line and Trans World, Allegheny and Southern all fall well below the line. Overall, no consistent pattern appears to differentiate the regulated airlines of the two countries.

The same dispersion in fuel utilization does not apply to the four intrastate carriers. The three largest intrastate carriers all had above average fuel utilization in terms of ATM per litre. Only Air Florida fell well below the trend line in a pattern that has existed throughout this study. Southwest, in contrast, had the largest percentage positive deviation from the trend line of all the carriers (at 24.6 per cent), followed by Frontier (20.5 per cent) and Air Canada (16.9 per cent).

The similarities among the regulated airlines of the two countries do not extend to the RTM per litre measure of fuel utilization. Figure 15 shows that five out of the seven Canadian carriers lie well <u>above</u> the trend line for this measure, with only Eastern Provincial and Transair being somewhat below the line. In contrast, during 1975-78, six out of the seven U.S. regulated airlines were located <u>below</u> the trend line. Frontier was the only CAB-regulated carrier with above average performance, even though Northwest and North Central were fairly close to the trend line.

The dichotomy in RTM per litre between the regulated airlines of the two countries appears to be due to the Canadian carriers having higher load factors than the U.S. carriers. As can be seen in Table 29, their all-services RTM load factors are equal to or higher than those of comparable U.S. trunk and local service carriers.[3] Furthermore, the revenue passenger-mile load factors in Table 29 indicate that the higher RTM load factors of the Canadian mainline carriers over the U.S. trunk carriers during these years were due to higher scheduled passenger load factors. In contrast, the Canadian regional carriers' superior performance in system RTM load factors was due to their high load factors in passenger charters which, of course, accounted for very large shares of their total traffic (over 60 per cent for Nordair and Quebecair -- see Table 7).

The more productive fuel utilization of the Canadian carriers in terms of RTM per litre would provide an argument in favour of their relatively limited competitive operations were it not for the generally comparable performances of the U.S. intrastate carriers under their competitive

Table 29

System Revenue Ton-Mile and Revenue Passenger-Mile Load Factors
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	1975-78 Load Factors			
	Revenue Ton-Mile	Revenue Passenger-Mile		
	All Services	Scheduled	Charter	All Services
Mainline				
Air Canada	48.3%	61.1%	85.9%[b]	62.0%
CP Air	52.5	63.2	83.0[b]	64.6
Trunk				
Trans World	48.3	57.8	87.1	59.1
Northwest	42.1	47.7	95.1	48.8
Delta	49.2	57.8	79.9	58.1
Intrastate				
Air Calif.	61.3[a]	71.3[a]	n.a.	n.a.
Air Florida	n.a.	53.4[a]	n.a.	n.a.
PSA	48.8	62.2	n.a.	n.a.
Southwest	47.7	66.3	n.a.	n.a.
Regional				
East. Prov.	60.9	53.5	88.4[b]	63.6
Nordair	n.a.	39.4	83.4[b]	74.5
Pac. Western	63.7	51.9	85.5[b]	62.7
Quebecair	n.a.	60.0	83.7[b]	75.6
Transair	n.a.	53.6	82.3[b]	64.1
Local Service				
Allegheny	50.5	56.0	70.7	56.4
Frontier	50.7	58.9	88.6	58.9
N. Central	43.7	50.1	63.9	51.0
Southern	44.8	51.9	59.7	52.7

Sources: Same as for Tables 23 and 28; Appendix G; SC(ASC) (j), p. 17

[a]Year ended December 31, 1978

[b]International charters for 1975-78 plus domestic charters for 1978

circumstances.[4] With the exception of Air Florida, the intrastate carriers' scheduled passenger load factors generally exceeded those of Air Canada and CP Air, with Air California being truly outstanding in this regard with a 71.3 per cent load factor in 1978 (and a 71.8 per cent average for the full four-year period) [Air California (a), 1976].[5] Furthermore, despite the very limited cargo services of the intrastate carriers (which reduced their RTM load factors), they were also similar to the Canadian carriers in terms of RTM load factors. As a result, the three largest U.S. intrastate carriers also lie above the RTM per litre trend line, with Air California now having the best performance of these three carriers and with PSA's lower load factor placing it close to, but still above, the trend line.

Reasons for Differences in ATM per Litre

Since fewer factors affect ATM per litre than RTM per litre, the lack of a consistent pattern of deviations in this measure (except for the three largest U.S. intrastate carriers) invites further analysis to attempt to determine other causes of variations in this measure of fuel consumption. Two factors were considered, but neither one was found to explain the deviations from the distance trend line for ATM per litre.

One of the two factors was average revenue aircraft miles flown per block hour (block-to-block speeds) by each carrier's turbofan/jet aircraft. The reasoning behind this analysis was that if fuel consumption is largely a function of the number of hours engines are actually operating, airlines able to cover more distance per block hour should produce more ATM per litre of fuel. Thus, for example, airlines operating into congested airports (where delays are longer and more frequent) would need more hours to cover a given distance, thereby yielding lower block-to-block speeds. This would mean producing fewer ATM per hour and, so, fewer ATM per litre of fuel. Implicit in this reasoning is the assumption that other factors affecting fuel consumption are equal. One such factor is the direct relationship between cruising speed and fuel consumption. Since higher cruising speeds also increase block-to-block speeds, the fuel saved by operating fewer hours due to faster speeds will be offset in whole or in part by the higher fuel consumption per hour required to fly faster. The net effects of such opposing considerations are reflected in a best-fit regression of the deviations of actual ATM per litre from the trend line shown in Figure 14 with system block-to-block speeds for the turbofan/jet aircraft of the federally-regulated airlines. This regression revealed no appreciable relationship between these two variables (R^2 = .015).

The second factor considered was the types of aircraft in each carrier's fleet. For example, if two-engine turbofan aircraft are relatively economical in using fuel to produce ATM, then carriers with large proportions of their fleets comprised of such aircraft would tend to have higher ATM per litre than those whose fleets were comprised primarily of other types of aircraft. Table 30 shows the percentage distribution by aircraft type of total system revenue aircraft miles produced by turbine-powered aircraft. It can be seen from this table that no single aircraft type was

Table 30

System Revenue Aircraft Miles Produced by Turbine-Powered Aircraft
Total Number and Percentage Distribution by Aircraft Type
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	Revenue Aircraft Miles Produced by Turbine-Powered Aircraft Per Cent of Total Number								
	Turbofan/Jet					Turboprop			Total Number (000)
	Wide-Body[a]	4-Engine Fan	4-Engine Jet	3-Eng.	2-Eng.	4-Eng.	2-Eng.	Commuter[b]	
Mainline									
Air Canada	19.0	24.9	4.7	11.8	39.6	-	-	-	482,166
CP Air	17.8	22.9	22.4	16.2	20.7	-	-	-	159,721
Trunk									
Trans World	20.1	45.7	-	30.0	4.2	-	-	-	1,112,716
Northwest	52.2	5.5	-	42.3	-	-	-	-	402,112
Delta	13.8	12.5	-	48.1	25.6	-	-	-	918,308
Intrastate									
Air Calif.	-	-	-	-	90.0[c]	10.0[c]	-	-	n.a.
Air Florida	-	-	-	-	100.0[d]	-	-	-	3,468[d]
PSA	0.2	-	-	93.7	2.1	4.0	-	-	94,205
Southwest	-	-	-	-	100.0	-	-	-	32,755
Regional									
East. Prov.	-	-	-	-	91.3	-	8.6	0.1	24,546
Nordair	-	12.6	-	-	73.4	2.2	9.9	1.9	37,751
Pac. Western	-	15.8	-	7.9	60.6	12.3	3.4	-	64,042
Quebecair	-	25.6	-	11.1	27.1	5.9	29.2	1.1	39,822
Transair	-	4.8	-	-	81.8	0.1	12.0	1.3	26,932
Local Service									
Allegheny	-	-	-	1.0	94.2	-	3.6	1.2	291,534
Frontier	-	-	-	-	61.7	-	35.4	2.9	160,924
N. Central	-	-	-	-	61.9	-	38.1	-	130,774
Southern	-	-	-	-	95.9	-	-	4.1	110,511

Sources: Air California (a), 1975, p. 24, 1976, p. 17, (c), June 9, 1978, Appendix D, p. 5 and (d), p. 11; Air Florida (b), Schedule A-1; CAB (e); PSA (g); Southwest (h), Schedule F; SC(ASC) (t) and (q)

[a]B-747, DC-10 and L-1011

[b]Aircraft having capacities of less than 40 seats, with most types having less than 20 seats

[c]Estimated from Air California's forecast for the California PUC that, during 1979, eleven B-737s would produce 87.2 per cent of total aircraft miles while four L-188s would produce 12.8 per cent. During 1975-78, Air California's actual fleet was composed of from seven to nine B-737s and two to three L-188s.

[d]Year ended September 30, 1978

operated by all carriers. Two-engine turbofan aircraft came the closest to being operated by all carriers, but Northwest did not operate any such aircraft during 1975-78, and only 2.1 per cent of PSA's turbine aircraft miles were operated by two-engine turbofans during these years. Both of these carriers did, however, operate three-engine turbofan aircraft. Therefore, combining the percentages of two-engine and three-engine turbofan aircraft results in all carriers being included and, indeed, it seems reasonable to assume these smaller jet aircraft should have fairly consistent relative rates of fuel consumption (be they high or low). But, a best-fit regression of the combined percentages for two-engine and three-engine turbofan aircraft for the federally-regulated airlines with the deviations of actual ATM per litre from the trend line in Figure 14 yields an R^2 of .176 -- again an insignificant relationship.

Still other factors could be considered. For example, it happens that among the 15 carriers for which ATM per litre information is available, most of the carriers whose major domestic operations were in the eastern part of North America had ATM per litre below the trend line, while those operating primarily in the midwest or western parts of the continent had ATM per litre above the trend line. The only exception was Air Canada which, despite being based in the east and serving many eastern points, had a relatively high ATM per litre.

Another relationship that fails to yield complete consistency is found among the smaller carriers. Out of the two Canadian regional carriers for which ATM per litre data are available, plus the four U.S. local service carriers, those that had relatively low percentages of two-engine turbofan aircraft miles (Pacific Western, Frontier and North Central) had average or above average ATM per litre, while those with over 90 per cent of total turbine aircraft miles produced by two-engine turbofan aircraft (Eastern Provincial, Allegheny and Southern) had ATM per litre falling below the trend line. However, this relationship did not extend to the U.S. intrastate carriers where Air California and Southwest achieved high ATM per litre with two-engine turbofans, while Air Florida did not even though its entire fleet during the period for which data are available was composed entirely of two-engine turbofans (DC-9-15).[6]

While it has not been possible to identify factors other than stage length that affect ATM per litre, RTM per litre were clearly influenced both by stage length and by load factor. Of course, the relationship with load factor is not surprising since RTM are also a part of that measure. Obviously, regardless of an aircraft's technical efficiency in utilizing fuel, its economic efficiency will increase as load factor increases. Therefore, actions that increase the average load of an aircraft also increase fuel utilization in an economically meaningful sense. During 1975-78, the Canadian carriers were able to achieve high average loads under limited rivalry and relatively <u>high</u> fares per mile (see Chapter I). At the same time, however, the U.S. intrastate carriers were also able to achieve high average loads and fuel utilization under intensive rivalry and relatively <u>low</u> fares per mile.

Table 31

Fuel Prices, Utilization and the Resulting Fuel Expenses per RTM
Canadian Mainline, Regional and Selected U.S. Carriers
1975-78 Average Values

Carrier	Fuel Prices ¢/Litre	Fuel Utilization RTM/Litre	Fuel Expenses per RTM ¢ per RTM Actual	Trend[a]	Deviation[b] ¢/RTM	Per Cent
Mainline						
Air Canada	10.762[c]	.819	13.145	14.441	-1.296	-9.0%
CP Air	11.175[c]	.879	12.713	12.849	-0.136	-1.0
Trunk						
Trans World	9.512	.698	13.770	12.999	0.771	5.9
Northwest	9.395	.712	13.195	14.310	-1.115	-7.8
Delta	9.058	.601	15.071	15.922	-0.851	-5.3
Intrastate						
Air Calif.	11.719[d]	.711[d]	16.482[d]	19.069	-[e]	-[e]
Air Florida	10.750[f]	.410[d]	26.220[g]	19.401	-[e]	-[e]
PSA	9.590	.591	16.221	18.322	-2.101	-11.5
Southwest	9.535	.637	14.958	18.699	-3.741	-20.0
Regional						
East. Prov.	11.775[c]	.530	22.207	18.869	3.338	17.7
Nordair	12.600[c]	.751	16.771	15.625	1.446	7.3
Pac. Western	12.107[c]	.703	17.216	18.303	-1.087	-5.9
Quebecair	11.915[c]	.709	16.812	17.487	-0.675	-3.9
Transair	11.211[c]	.593	18.896	16.149	2.747	17.0
Local Service						
Allegheny	9.244	.472	19.551	19.001	0.550	2.9
Frontier	9.543	.618	15.454	19.654	-4.200	-21.4
N. Central	9.660	.447	21.619	21.878	-0.259	-1.2
Southern	9.110	.404	22.089	19.654	2.435	12.4

Sources: Same as for Tables 23 and 24 plus Table 28 and Appendices E and K

[a]Calculated from data for the federally-regulated airlines using the equation: $\text{Log } Y = \text{Log } 88.206 - .281 \text{ Log } X$, $R^2 = .693$

[b]Actual fuel expenses per RTM minus trend values

[c]After exchange rate adjustments pertaining to fuel purchased in other countries for transborder and international flights

[d]Year ended December 31, 1978. Fuel price is partially estimated.

[e]The calculation is inappropriate due to the use of different time periods.

[f]Year ended July 31, 1978

[g]Assuming fuel utilization was the same for the years ended July 31, 1978 and December 31, 1978

Fuel Expenses

The combined effects of differences in fuel prices and fuel utilization can be measured by fuel expenses per RTM. Table 31 presents these data for the carriers averaged over 1975 to 1978. The fuel expenses per RTM are plotted against average stage lengths in Figure 16, and it can be seen that there is a negative relationship between the two variables (which is consistent with the positive relationship between RTM per litre and distance), with the R^2 for the federally-regulated airlines' best-fit trend line being .693.[7]

Table 31 also gives the deviations of actual fuel expenses per RTM from the trend-line values depicted in Figure 16. The percentage deviations from the trend line range from Frontier's -21.4 per cent to the positive deviations of 17.7 and 17.0 per cent for Eastern Provincial and Transair. As was the case for ATM per litre, no consistent differences were found between the federally-regulated airlines of Canada and those of the United States. In Canada, three of the seven airlines had above average fuel expenses per RTM while four had below average expenses per RTM (including CP Air whose actual figure was just 1.0 per cent below the trend line). Similarly, three of the CAB-regulated U.S. airlines had above average fuel expenses per RTM while four were below average.

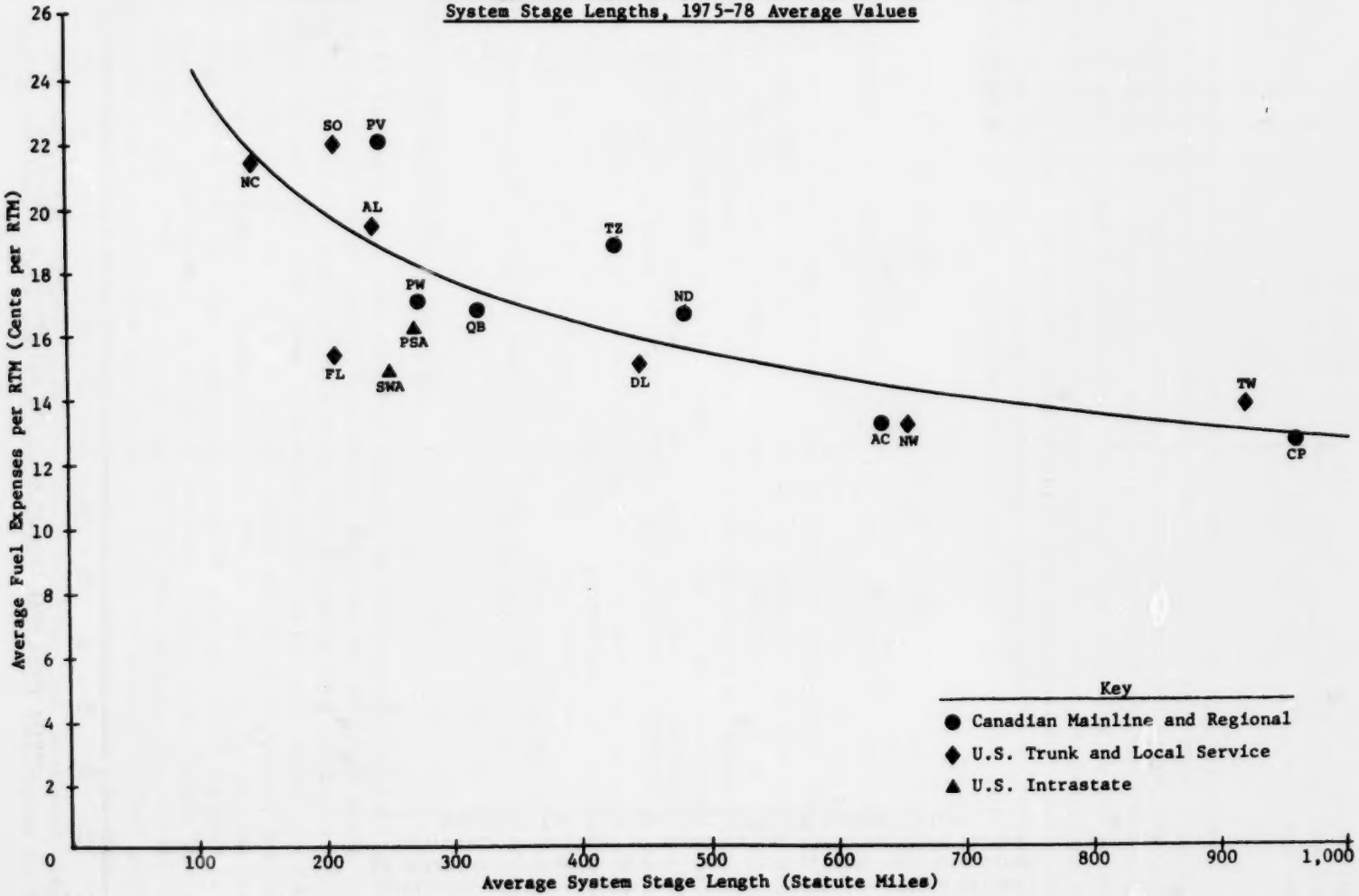
Among the intrastate carriers, fuel expense data for the full four-year period are available for just PSA and Southwest. Both of these carriers achieved fuel expenses per RTM that were well below the federally-regulated airlines' trend line (-11.5 and -20.0 per cent, respectively), and Air California's very high load factors mean that it too had a negative deviation.[8] Air Florida, in contrast, probably had higher than average fuel expenses per RTM.[9]

The joint effects of prices and utilization on expenses per RTM are indicated in Figure 17 which is a scatter diagram on which the deviation of each carrier's actual RTM per litre from the distance-related trend line is plotted against its average fuel price.[10] In addition, the percentage deviation of each carrier's fuel expenses per RTM from the distance-related trend line in Figure 16 is specified next to its plot. The diagram is divided into four quadrants by a horizontal line depicting zero deviation from the federally-regulated airlines' fuel utilization trend line and by a vertical line depicting the simple average of their fuel prices (see Table 31).

Frontier, Southwest and PSA had the lowest fuel expenses per RTM (-21.4, -20.0 and -11.5 per cent below the trend line, respectively), and all are located in the northwest quadrant of Figure 17, which means that they had both below average fuel prices and above average deviations in RTM per litre. At the other extreme, Eastern Provincial and Transair were located in the southeast quadrant, meaning that they had above average fuel prices and below average deviations in RTM per litre. Thus, it is not surprising to find they had high fuel expenses per RTM (17.7 and 17.0 per cent above the trend line). Southern and Nordair also had high fuel expenses per

Figure 16

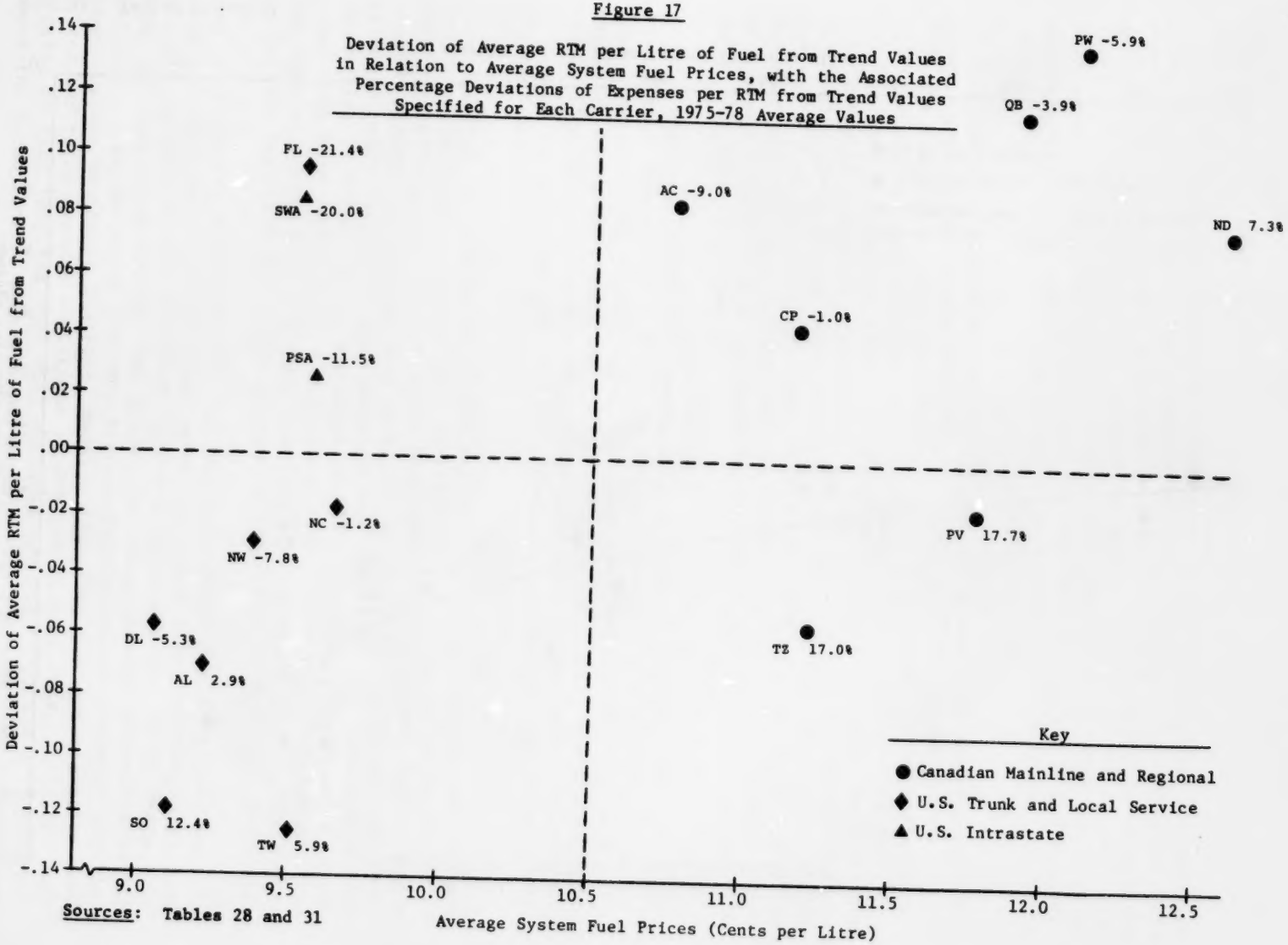
Average Fuel Expenses per RTM in Relation to System Stage Lengths, 1975-78 Average Values



Sources: Tables 28 and 31

Figure 17

Deviation of Average RTM per Litre of Fuel from Trend Values in Relation to Average System Fuel Prices, with the Associated Percentage Deviations of Expenses per RTM from Trend Values Specified for Each Carrier, 1975-78 Average Values



Sources: Tables 28 and 31

RTM (12.4 and 7.3 per cent above the trend line). Figure 17 implies that Southern's low average fuel price was more than outweighed by its low fuel utilization, while Nordair's relatively high RTM per litre was counterbalanced by its very high average fuel price.

There was no obvious pattern among the remaining nine carriers. In the southwest quadrant, the relatively low prices of the five remaining U.S. carriers were associated with below average RTM per litre, yielding roughly average fuel expenses per RTM (ranging from -7.8 per cent below the trend line for Northwest to 5.9 per cent above the line for Trans World). The remaining four Canadian carriers were all in the northeast quadrant, reflecting their high prices and above average fuel utilization. Their fuel expenses per RTM were somewhat below average (ranging from -9.0 per cent below the trend line for Air Canada to -1.0 per cent below the line for CP Air.

Production theory (and common sense) implies that carriers paying higher fuel prices will seek to obtain greater output per litre of fuel. Figure 17 indicates that this has been the case among North American carriers. All seven Canadian carriers had higher average fuel prices in 1975-78 than the nine U.S. carriers for which price data are available. Five of the Canadian carriers (71 per cent) produced above average RTM per litre while only three of the U.S. carriers (33 per cent) managed to do so. Furthermore, two of the three above average U.S. carriers were intrastate carriers, leaving Frontier as the sole CAB-regulated airline to achieve above average fuel utilization.[11] It appears that it is possible for the airlines of both countries to achieve above average fuel utilization (after adjusting for the effects of distance). Higher fuel prices may have been the motivation for most Canadian carriers, while the largest U.S. intrastate carriers were motivated by other factors, perhaps by the need to lower costs in order to survive while offering low fares per mile. Another possibility is that the intrastate carriers' small, homogeneous route systems also facilitated fuel conservation.

Effects on Total Operating Expenses

An indication of the combined effects of differences in fuel prices and utilization on total operating expenses is given in Table 32 where each carrier's total system RTM for 1975-78 is multiplied by the deviation of its fuel expenses per RTM from the distance-related trend line given in Table 31. Adding the resulting value to actual total operating expenses (for carriers with below average fuel expenses per RTM) or subtracting it (for carriers with above average fuel expenses) yields the carrier's hypothetical total operating expenses had it achieved average (trend line) values for its fuel expenses per RTM. The percentage difference between the actual and hypothetical figures indicates the extent to which variations in fuel prices and utilization caused total operating expenses to deviate from the norm.

The percentage differences for PSA, Frontier and Southwest imply that fairly low fuel prices and high utilization can yield reductions in to-

Table 32

Effects of Deviations in Fuel Expenses per RTM on Total System Operating Expenses
Canadian Mainline, Regional and Selected U.S. Carriers, 1975-78 Total Values

Carrier	1975-78 Total System RTM (000)	Fuel Exp. Deviation ¢/RTM	Total Fuel Saving (-) or Increase[a]	1975-78 Total System Operating Expenses Can. or U.S. Dollars (000) Actual	Hypothetical[b]	Percentage Difference
Mainline						
Air Canada	5,971,529	-1.296¢	$-77,391,000	$4,272,221	$4,349,612	-1.8%
CP Air	2,387,679	-0.136	-3,247,000	1,477,070	1,480,317	-0.2
Trunk						
Trans World	12,491,772	0.771	96,312,000	8,567,974	8,471,662	1.1
Northwest	6,032,110	-1.115	-67,258,000	3,304,273	3,371,531	-2.0
Delta	8,863,049	-0.851	-75,425,000	6,581,933	6,657,358	-1.1
Intrastate						
Air Calif.	n.a.	n.a.	n.a.	-	-	-
Air Florida	n.a.	n.a.	n.a.	-	-	-
PSA	908,126	-2.101	-19,080,000	701,253	720,333	-2.6
Southwest	245,302	-3.741	-9,177,000	139,824	149,001	-6.2
Regional						
East. Prov.	153,835	3.338	5,135,000	169,293	164,158	3.1
Nordair	299,475	1.446	4,330,000	211,167	206,837	2.1
Pac. Western	540,753	-1.087	-5,878,000	449,300	455,178	-1.3
Quebecair	291,948	-0.675	-1,971,000	223,922	225,892	-0.9
Transair	164,497	2.747	4,519,000	139,864	135,345	3.3
Local Service						
Allegheny	1,630,916	0.550	8,970,000	1,801,463	1,792,493	0.5
Frontier	812,399	-4.200	-34,121,000	823,633	857,754	-4.0
N. Central	612,194	-0.259	-1,586,000	807,180	808,766	-0.2
Southern	509,398	2.435	12,404,000	585,135	572,731	2.2

Sources: Table 31 and Appendices C and E

[a]Total system RTM times fuel expenses deviation from the distance-related trend line

[b]Actual system operating expenses plus total fuel saving or minus total fuel increase

tal operating expenses of 2.6 to 6.2 per cent from the norm. In contrast, Eastern Provincial and Transair's high prices and low utilizations resulted in increases in actual over hypothetical operating expenses of 3.1 to 3.3 per cent. Since the relatively high fuel prices paid by the Canadian regional carriers were due largely to factors beyond their direct control (higher taxes and airport fees plus, probably, the high costs of supplying fuel in remote locations), it would not have been feasible for Eastern Provincial and Transair to reduce their total operating expenses to match the 6.2 per cent difference achieved by Southwest (a gross change of over nine per cent). However, if Quebecair and Pacific Western were able to achieve actual operating expenses 0.9 to 1.3 per cent lower than their hypothetical levels by producing relatively high RTM per litre while paying high fuel prices, it appears that reductions in total operating expenses in the order of four per cent were possible for Eastern Provincial and Transair, and perhaps three per cent for Nordair.

A similar conclusion applies to the U.S. carriers. Given the consistency in their fuel prices, it follows that carriers with high expenses per RTM (Trans World, Allegheny and Southern) could have reduced their total operating expenses by five to six per cent during 1975-78 had they achieved fuel utilization relative to the trend line comparable to that achieved by Frontier, PSA and Southwest.

Summary

Even though the differences in fuel prices (including taxes and airport fees) between the two countries were relatively large, equal or greater differences existed in terms of fuel utilization. As calculated in Table 28, the federally-regulated airlines had deviations in RTM per litre around a distance-related trend line ranging from -22.6 to 19.6 per cent (an interval of 42.2 percentage points). RTM per litre of fuel is an economically meaningful measure of output and it happens that all but two of the Canadian carriers were above average in RTM per litre, while all but one of the CAB-regulated airlines were below average. At the same time, the U.S. intrastate carriers (except Air Florida) also had above average performance similar to that of the superior Canadian carriers (see Table 28 and Figure 15).

The high system fuel utilization of the Canadian carriers (except Eastern Provincial and Transair) relative to the lower utilization of the CAB-regulated airlines (except Frontier) tended to balance out the effects of the higher Canadian system fuel prices. The combined effects of fuel prices and fuel utilization are shown by calculating fuel expenses per RTM. During 1975-78, similar fuel expenses per RTM existed among the federally-regulated airlines in the two countries. About half of the carriers of each country had higher than average fuel expenses per RTM (relative to a distance-related trend line) while the other half had lower than average expenses per RTM (see Table 31 and Figure 16). At the same time, however, the three largest U.S. intrastate carriers (plus Frontier) had the lowest expenses per RTM (relative to the trend line) because they enjoyed both low fuel prices and high fuel utilization (see Table 31, Figures 16 and 17 and footnote 8).

Multiplying each carrier's total RTM for 1975-78 by its deviation in fuel expenses per RTM from the distance-related trend line indicates the amounts that actual total operating expenses were reduced or increased by the carrier having fuel expenses per RTM below or above the norm (see Table 32). After allowing for the higher fuel expenses of the Canadian regional carriers due to operating in remote regions of the country, this analysis implies that the total operating expenses of Eastern Provincial and Transair (the carriers with the highest fuel expenses per RTM) might have been reduced by as much as four per cent by increases in their RTM per litre. Similarly, the U.S. carriers having high fuel costs (Trans World, Allegheny and Southern) could have reduced total operating expenses by five to six per cent through increasing RTM per litre up to the levels achieved by the intrastate carriers.[12]

Here again the by now familiar pattern has been found. The federally-regulated airlines in Canada and the United States had similar fuel expenses per RTM, while the U.S. intrastate carriers (except Air Florida) had lower fuel expenses per RTM. As in the case of labour productivity and expenses, one CAB-regulated carrier did not fit the general pattern and was more like the three largest intrastate carriers. This time, however, it was Frontier rather than Northwest that was exceptional, even though Northwest (followed by Air Canada) did have below average fuel expenses per RTM. Once more the major intrastate carriers' low fuel expenses per RTM were consistent with their low fares per mile. Furthermore, they achieved their low fuel expenses per RTM by producing high RTM per litre, not by having lower fuel prices. Since all carriers have significant influence over the generation of traffic (through scheduling practices, fare policies, etc.), it is clear that the intrastate carriers played an important role in reducing their fuel expenses, and they did so in relatively competitive environments.

Footnotes

1. ATM per litre and RTM per litre are preferable to the more direct measure of aircraft miles per litre because fuel consumption is heavily influenced by aircraft size. Obviously, large aircraft (such as the B-747) have higher fuel consumptions per mile flown than smaller aircraft (such as the B-737 or DC-9). Therefore, using aircraft miles per litre as a measure of fuel utilization would result in the Canadian regional and the U.S. intrastate and local service carriers (with their fleets of small aircraft) having better fuel utilization than the Canadian mainline and U.S. trunk carriers with their mixed fleets of large and small aircraft. This bias against large aircraft is partially (or entirely) offset by the use of ATM or RTM per litre because these aircraft have greater capacities as well as higher fuel consumptions per aircraft mile. Of course, a direct measure of relative fuel utilization would be achieved by comparing each carrier's fuel consumption per aircraft mile for each aircraft type. Unfortunately this cannot be done in this study because only total system fuel consumption is reported to Statistics Canada by Canadian carriers in contrast to the de-

tailed data for individual aircraft type that are reported to the CAB by U.S. carriers.

2. Based on the lowest mean squared error, the best fit for ATM per litre was obtained from the following equation: Log Y = Log .174 + .329 Log X. The associated R^2 of .716 is significant at the one per cent level (see footnote 3, Chapter III). There are only 11 observations for the federally-regulated airlines' ATM per litre because ATM data are not available for Nordair, Quebecair and Transair. The best fit for RTM per litre was obtained from the equation: Y = X/(183.400 + 1.077X), R^2 = .619. However, because the differences in R^2 were small, and in order to be consistent with the ATM per litre regression, it was decided to use the following equation for RTM per litre: Log Y = Log .100 + .309 Log X. The associated R^2 of .615 is significant at the one per cent level.

3. Air Canada's RTM load factor equals that of TWA at 48.3 per cent. However, since Air Canada's ATM per litre measure of fuel utilization lies well above the trend line while TWA's falls well below (see Figure 14), an equal RTM load factor means that Air Canada's RTM per litre fuel utilization will also be superior to that of TWA. The remaining Canadian carriers all had appreciably higher RTM load factors than their U.S. counterparts (52.5 per cent for CP Air vs. 42.1 per cent for Northwest, as an example).

4. During 1975-78 domestic rivalry among the Canadian carriers was largely limited to the transcontinental services of Air Canada and CP Air where CP Air was restricted to around 25 per cent of scheduled ASM. This was in sharp contrast to the U.S. regulated airlines where essentially all major domestic city pairs had from two to ten generally unrestricted carriers authorized to provide service. Internationally, Canadian carriers participated in a number of pooling operations with their foreign counterparts while such pools were rare exceptions among U.S. carriers (the Pan American/Aeroflot pool being one of those exceptions). Only in transborder operations did the carriers of the two countries face similar degrees of rivalry. The rivalry faced by the U.S. intrastate carriers was much greater during these years since the regulatory duopoly in each state allowed price, as well as service-quality, rivalry among carriers. Only Air California enjoyed a monopoly in several of its major city pairs (those originating/terminating at Santa Ana/Orange County airport).

5. Additional information was supplied by Mr. F.R. Davis, Vice President -- Marketing (Oct. 12, 1978), and Mr. M.P. Van Dordrecht, Vice President & Treasurer (July 18, 1979).

6. The fact that the DC-9-15 is a relatively small and early model two-engine turbofan aircraft may adversely affect Air Florida's ATM per litre. It is interesting to note that Air Florida obtained all of its DC-9-15 aircraft from Air Canada. The first of these aircraft was placed in service on June 19, 1977, while Air Florida's first B-737-200 aircraft began service on November 16, 1978 (Air Florida, company records).

7. Based on the lowest mean squared error, the equation for the best-fit trend line is Log Y = Log 88.206 - .281 Log X. The associated R^2 of .693 is significant at the one per cent level (see footnote 3, Chapter III).

8. Air California estimated its 1978 fuel costs at $13,898,000 based on actual experience for the first ten months of that year [(c), Dec. 28, 1978, Appendix A; also see Table 23]. Its actual 1978 fuel consumption was 118,592,810 litres. These data imply an average price (probably including oil expenses, taxes and airport fees) of 11.719 cents per litre. Table 24 shows that this is approximately one cent per litre (ten per cent) higher than the simple average of the prices paid by all the other U.S. carriers in 1978. Therefore, it seems likely that Air California's fuel cost estimate for the PUC was somewhat exaggerated. This should not be surprising given its objective of obtaining an increase in fares. However, even using the estimated fuel cost associated with this high fuel price, Air California's average fuel expense was 16.482 cents per RTM, which is still 10.5 per cent below the 1975-78 trend line for a 235-mile stage length. Clearly, the difference would be even greater for Air California's average 1975-78 fuel expense.

9. Air Florida's estimated fuel expense was 26.220 cents per RTM during the year ended July 31, 1978. This was almost 60 per cent higher than Air California for roughly the same time period.

10. The average fuel prices for Canadian carriers are after exchange rate adjustments pertaining to fuel purchased in other countries for trans-border and international flights. Thus, the Canadian and U.S. fuel prices are generally comparable. See Table 25 and Appendix K.

11. Air California would doubtless also be in this group if its data were available, while Air Florida would be among the remaining U.S. carriers in the southwest quadrant.

12. The very large increases in fuel prices in the United States following the decontrol of turbine fuel prices in February 1979 has resulted in U.S. fuel prices rising above Canadian fuel prices (see footnote 1, Chapter VIII). Therefore, if there has been little relative change in fuel utilization, it follows that most of the Canadian carriers should now be enjoying fuel expenses per RTM below those of most of the CAB-regulated airlines. Whether or not this situation will continue depends on federal government policies regarding fuel prices, taxes and airport fees.

Chapter X

WEATHER AND AIRLINE COSTS

Canadian airline executives frequently state that adverse weather and smaller population are important reasons for differences in airline costs and employee productivity between Canadian and U.S. carriers. The argument is that Canadian carriers operating under relatively adverse weather and serving sparsely populated geographic areas (having low traffic densities) are unable to utilize employees, aircraft and other inputs as productively as U.S. carriers operating under more favourable conditions. The following quotation from Mr. G.B. Hunnings, Assistant Vice-President, Public Affairs, of CP Air, summarizes this position:

> There are some who will claim that the wide differences between fares in Canada and the "efficient" cost of production of United States carriers is not explainable by the fact that factor input prices are higher in Canada, that Canada has a Federal Sales Tax; more severe, generally speaking, weather conditions, and that the Canadian market is about a tenth the size and much more randomly distributed than U.S. markets. (1979, pp. 4-5)

It happens that the evidence presented in this study challenges several aspects of this statement. First, Chapter I and previous research demonstrated that through 1978 wide differences did <u>not</u> exist between the domestic and transborder coach/economy fares of the federally-regulated airlines in Canada and the United States. Second, similarities, rather than differences, were also found to exist among the federally-regulated airlines of the two countries in terms of total operating expenses per RTM (Figure 4), RTM per employee (Figure 8) and revenues per employee (Figure 9). Third, it was shown that average system payments for labour were lower (not higher) among the Canadian carriers than their U.S. counterparts (Table 20), and that these lower payments, when combined with similar employee productivity, tended to provide Canadian carriers with somewhat lower average employee payments per RTM than the CAB-regulated U.S. carriers (Figure 13). Thus, Mr. Hunnings' statement appears to be incorrect in several important respects. He is correct, however, regarding the federal sales tax; it contributed to making fuel prices higher in Canada than in the United States. But because of the Canadian carriers' higher RTM per litre of fuel (Figure 15), the higher fuel prices did not carry over into higher fuel expenses per RTM in Canada than in the United States.

Overall, Mr. Hunnings' implication of U.S. superiority does not apply to the federally-regulated airlines of the two countries. To the contrary, the similarities among these carriers are more prevalent than their differences. At the same time, however, lower fares and more efficient production did characterize the U.S. intrastate carriers compared with the federally-regulated airlines of both countries. This finding is consistent

with the hypothesis that the major source of performance differences is the regulatory monopoly within which the federally-regulated airlines operated as opposed to the regulatory duopolies of the intrastate carriers. But Mr. Hunnings might extend his argument regarding weather and population to the intrastate carriers and say that their performances differed from those of the federally-regulated airlines mainly because of favourable weather and population characteristics rather than regulatory differences. Therefore, this chapter will present both direct and indirect evidence regarding the effects of weather on airline performance, while the possible effects of population differences will be investigated in Chapter XI.

Transportation and Weather

Weather affects productivity, and therefore costs, in all industries where significant proportions of total production must be undertaken in the out-of-doors. Examples include agriculture, construction and all modes of transportation -- motor, rail and water, as well as air.

It happens that airlines have an advantage over surface modes in being less affected by snow, ice, rain and fog during enroute operations. Especially adverse weather can often be avoided by flying over or around it at relatively low additional cost, while surface carriers generally have to plough through adverse conditions.[1] Airlines are, however, disadvantaged relative to surface carriers in terms of weather in and around terminals. If the weather gets too bad, a truck, bus or train can stop where it is (or pull off onto a shoulder or siding) and a ship can heave to until the weather improves. In some respects, surface vehicles can establish a temporary "terminal" almost anywhere. The airplane does not have this convenient response to adverse weather. It can only land (stop) at airports, and this can be done only if local weather conditions are not too severe and only after all aircraft already on the scene have landed. Also, a commercial airliner cannot depart from an airport if it is closed by weather or, unlike surface vehicles, if the destination and alternate airports are forecast to be closed at the estimated time of arrival. Clearly, the critical weather conditions of airline operations are those experienced at airports rather than enroute. Thus, a comparison of the effects of weather on airline performance can concentrate on the relative weather conditions at the airports served by each carrier.

Finally, it should be recognized that all airlines experience adverse weather conditions. Therefore, the question is the degree to which some airlines experience relatively more adverse weather than other airlines, not whether some airlines enjoy good weather conditions while others have bad conditions.

Direct Evidence Regarding Weather

Historical weather data for many (but not all) airports served by the airlines have been published by the Atmospheric Environment Service of Environment Canada (1975) and the National Oceanic and Atmospheric Adminis-

tration of the U.S. Department of Commerce. The data for every available North American airport served in 1978 by each of the 18 Canadian and U.S. carriers included in this study were recorded from these sources. The resulting "sample" ranged from a 93 per cent coverage for Air Canada (39 out of 42 airports), down to 45 per cent for Air California (five out of 11 airports). The simple average for each of four weather factors was then calculated for each carrier, and the carriers were compared on the basis of these averages.[2]

The first factor to be considered was the mean annual snowfall. This indicates the relative amounts of time airports may be closed due to runways and taxiways being blocked by snow, the extent to which it is more difficult to operate ground handling equipment, and the higher fees paid by airlines to airport operators to cover the costs of snow removal. The second factor was the percentage of times during regularly scheduled weather observations (taken throughout each day) that the ceiling and/or visibility fell below the Category I minimums of 200 foot ceiling and/or one-half mile visibility, thereby preventing landings and takeoffs at most major airports.[3] The third was the mean minimum temperatures during December through March, which indicates the extent to which extra ground facilities, heating systems and fuel, heavy clothing, etc., are required to protect employees, traffic and equipment. Finally, the mean maximum temperatures during June through August were also recorded. The effects of hot weather may be less obvious than cold weather, but they exist nonetheless. They include additional fuel required for takeoffs due to air density decreasing as temperatures rise (this may also reduce payloads on long-haul flights), costs of air conditioning, and the possibility that employees become less productive in very hot weather.[4]

The simple averages for the four weather factors are presented in Table 33 for each carrier. A review of this information (and looking at Figures 18 to 21 below) points out several general facts regarding weather. For one thing, on average, Canadian carriers face heavier snowfalls within North America than do the federally-regulated U.S. carriers, and the U.S. intrastate carriers experience very little snow. Associated with this is the expected finding that Canadian carriers have lower average minimum winter temperatures than U.S. carriers (except for North Central), and they also experience lower summer temperatures. Again, the intrastate carriers are well off in having the highest minimum winter temperatures, but Air Florida and Southwest have also had the hottest summer temperatures (with Air California and PSA being average in this factor). All this, of course, simply verifies the obvious -- winters are more severe and summers are cooler in Canada than in the United States, and the Canadian carriers with transborder routes do not serve enough U.S. airports to offset the effects of Canadian weather when calculating simple weather averages for North American operations.

The clear dichotomy between the carriers of the two countries does not extend to Category I ceiling/visibility minimums. Table 33 shows that most of the Canadian carriers face below minimum conditions from 1.5 to 3.0

Table 33

Mean Snowfall, Percentage of Observations Below Category I Minimums and Mean Temperatures at North American Airports[a] Served by Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	Number of Air-ports	Mean Annual Snowfall (inches)	Percentage of Observations Below Category I Minimums[b]	Mean Temp. (°F) Dec-Mar Minimum	Mean Temp. (°F) Jun-Aug Maximum
Mainline					
Air Canada	39	75.2	2.2	17.7	74.5
CP Air	16	59.2	1.1	17.9	72.2
Trunk					
Trans World	35	22.4	0.8	29.9	84.5
Northwest	34	31.7	1.0	25.6	80.4
Delta	63	18.5	1.1	32.7	85.3
Intrastate					
Air Calif.	5	0.02	1.3	45.1	80.4
Air Florida	6	0.0	1.1	51.4	89.2
PSA	7	0.01	1.6	44.8	81.2
Southwest	6	3.1	1.0	39.5	92.2
Regional					
East. Prov.	15	136.1	3.0	10.0	69.3
Nordair	12	84.3	1.9	0.5	66.7
Pac. Western	31	54.8	1.2	5.6	69.2
Quebecair	8	129.8	1.5	2.4	69.8
Transair	13	69.2	2.1	-10.4	63.1
Local Service					
Allegheny	42	41.9	1.1	24.0	82.0
Frontier	32	28.8	0.8	23.8	86.8
N. Central	33	47.3	1.1	16.7	80.5
Southern	28	13.3	1.2	34.4	86.8

Sources: Atmospheric Environment Service (1975); National Oceanic and Atmospheric Administration, various dates

[a]Including Honolulu

[b]Less than 200 ft. ceiling and/or ½ mile visibility

per cent of the time, compared with 0.8 to 1.2 per cent for most of the U.S. carriers. However, CP Air and Pacific Western -- at 1.1 and 1.2 per cent below minimum conditions -- fall within the range of the majority of the U.S. carriers, and PSA is located up with some of the Canadian carriers at 1.6 per cent.[5]

Given that the Canadian carriers generally face more adverse weather than U.S. carriers, the next question is whether or not this makes an appreciable difference in their operating expenses per unit of output. Average operating expenses per RTM for 1975-78 are listed in Table 5. Regressing these data for the federally-regulated airlines against each of the four weather factors yields R^2 for the best-fit regressions ranging from .006 (Category I minimums) to .065 (maximum temperature).[6] Furthermore, comparisons of individual carriers also indicate no relationship exists between weather and operating expenses per RTM. For example, Table 5 shows that Allegheny and Eastern Provincial both had 1975-78 average operating expenses of about $1.10 per RTM (in their respective currencies); yet, as can be seen in Table 33, Eastern Provincial operated with 3¼ times more snow, below Category I minimums 2.7 times more frequently, and average winter temperatures 14 degrees Fahrenheit colder than Allegheny. Only in summer temperatures did it have an advantage over Allegheny.

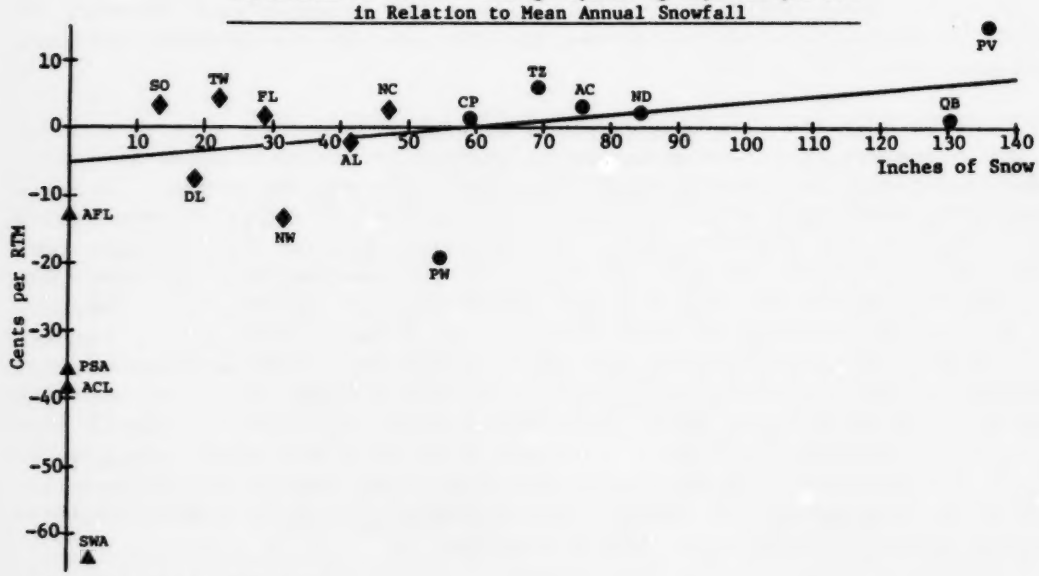
All of the operating expense and productivity analyses in Chapters III, VI and IX demonstrated clear associations between these performance factors and distance for the federally-regulated airlines. Therefore, the possible effects of weather on operating expenses per RTM may have been obscured by the important inverse relationship between operating expenses and distance. To determine if this was the case, the deviations of operating expenses per RTM from the distance-related trend lines (Table 5) were regressed against each of the four weather factors given in Table 33. If adverse weather appreciably affects operating expenses, it follows that these deviations should be directly related to one or all of these factors. That is, federally-regulated airlines operating under more adverse weather conditions should have their actual operating expenses per RTM above the trend line in Figure 4 (positive deviations), while those enjoying less adverse weather should have actual values below the trend line (negative deviations).

The scatter diagrams for the deviations in operating expenses per RTM (in cents per RTM) and each of the weather factors are plotted in Figures 18 to 21. In addition, the best-fit trend lines for the federally-regulated airlines are drawn in each figure. It can be seen that the slopes of the regression lines in these figures have the predicted signs except for the maximum temperature regression. However, the slopes are very flat and the only relationship that is statistically significant at the five per cent level is for Category I minimums, with an R^2 of .299.[7]

Similar results were obtained when regressing deviations of actual RTM per employee from their distance-related trend line values (Table 16) with the weather factors in Table 33. After deleting the unusually large

Figure 18

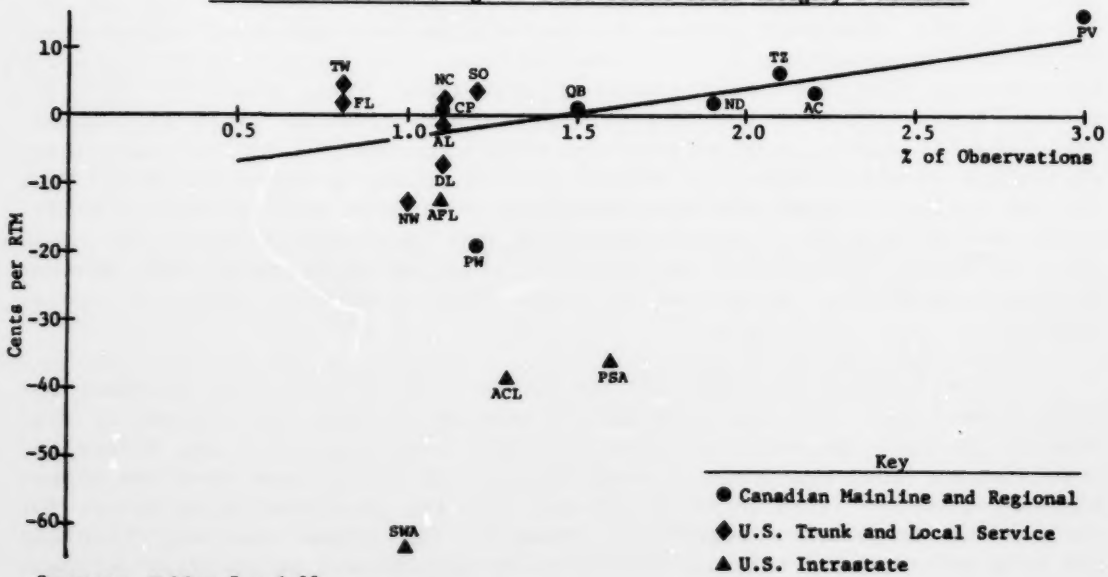
Deviations of 1975-78 Average Operating Expenses per RTM in Relation to Mean Annual Snowfall



Sources: Tables 5 and 33

Figure 19

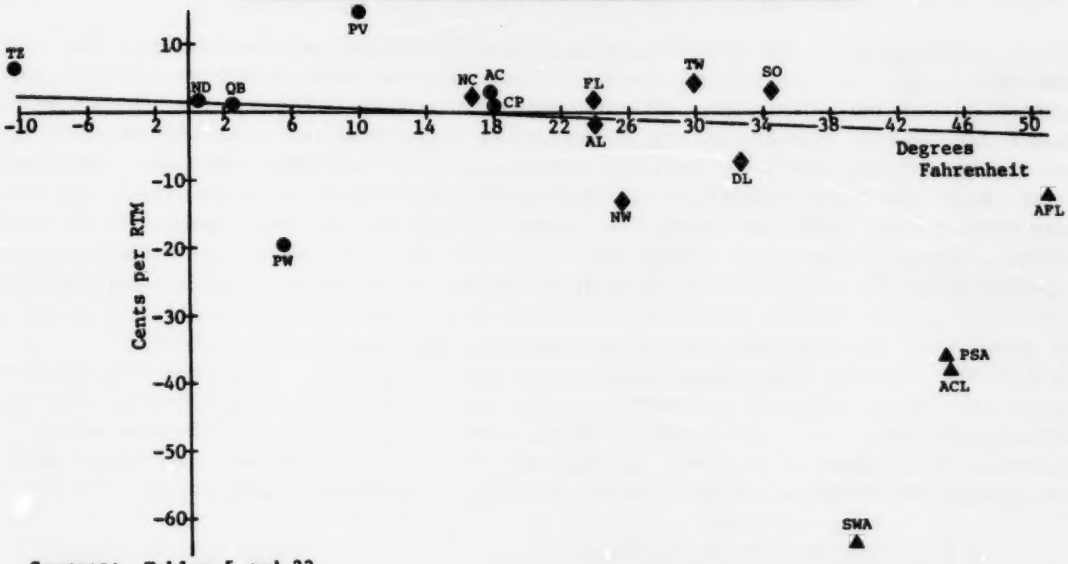
Deviations of 1975-78 Average Operating Expenses per RTM in Relation to Percentage of Observations Below Category I Minimums



Sources: Tables 5 and 33

Figure 20

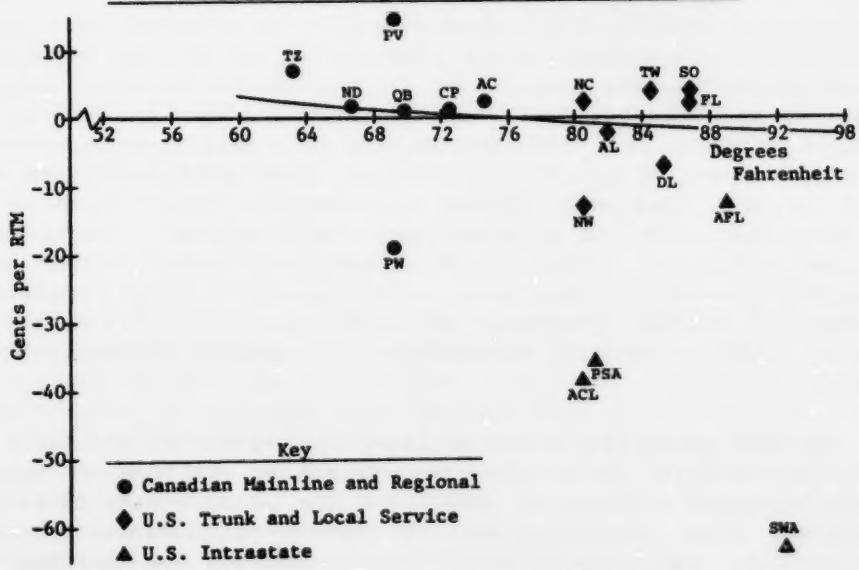
Deviations of 1975-78 Average Operating Expenses per RTM in Relation to December-March Mean Minimum Temperatures



Sources: Tables 5 and 33

Figure 21

Deviations of 1975-78 Average Operating Expenses per RTM in Relation to June-August Mean Maximum Temperatures



Sources: Tables 5 and 33

deviation for Northwest (as was also done in Chapter VI), the only statistically significant association (at the five per cent level) was between Category I minimums and RTM per employee, with an R^2 of .298.[8]

In summary, no statistically significant correlation exists for the federally-regulated airlines between each of the four weather factors and operating expenses per RTM. At the same time, only Category I minimums were found to have a statistically significant relationship with deviations in actual operating expenses per RTM and deviations in actual RTM per employee from their respective best-fit distance-related trend lines. These latter findings would indicate that the lower operating expenses per RTM of the three largest intrastate carriers could be due in part to less adverse weather were it not for the fact that these carriers did not operate under appreciably favourable Category I conditions. Indeed, Table 33 and Figure 19 show that these carriers experienced below Category I minimums from 1.0 to 1.6 per cent of the time, which is quite similar to the experience of the trunk and local service carriers in the United States, plus CP Air, Pacific Western and Quebecair in Canada. Therefore, with regard to all four weather factors, this direct evidence indicates that the intrastate carriers' very low operating costs were not due to favourable weather conditions.

Indirect Evidence Regarding Weather

In addition to the direct measurement of the effects of weather on airline costs and labour productivity, another way to obtain evidence on whether or not the more severe Canadian weather appreciably increases airline costs is to analyze indirect evidence on the subject. For example, if Canadian carriers are appreciably affected by relatively adverse weather over their systems (especially during the four winter months), one would expect this to be reflected in their employment practice. Specifically, not only should Canadian carriers have to hire more employees in order to produce a given amount of output, but most of these added employees should be assigned to jobs that are exposed to weather. Thus, Canadian carriers should have lower RTM per employee and should employ proportionally more pilots and copilots, other flight personnel (cabin attendants), and terminal/ramp personnel than U.S. carriers, while having proportionally fewer employees working indoors in positions that are not directly affected by weather (such as general management, accounting, purchasing and sales personnel).

Employee productivity was analyzed in Chapter VI, and Table 16 shows that during 1975-78 there was no systematic difference between the federally-regulated airlines of Canada and the United States in terms of RTM per employee, after adjusting for the effects of distance. Four of the Canadian carriers had negative deviations (relatively low employee productivity) and three had positive deviations, while the U.S. carriers were also divided almost equally with three negative and four positive deviations. It is interesting to note that Southern was one of the U.S. carriers with negative deviations despite its favourable location in the south, while Northwest had a large positive deviation even though it operated primarily along

the Canadian/U.S. border. All of this, of course, is inconsistent with the argument that Canadian weather has an important adverse effect on Canadian airline performance.

It would be desirable to group employees strictly in accordance with their work locations when comparing the airlines of the two countries in terms of their distributions of employees between outdoor and indoor jobs. Unfortunately, it is not possible to do this because Canadian data are available only for the six major categories listed in Appendix I. Therefore this analysis must be limited to those general categories and the U.S. data have been aggregated to provide comparable employment data for each category. Table 34 presents the percentage distribution of the average number of employees during 1975-78 for all six categories for the various carriers.

Of these six categories, the two whose members are all affected by weather are the pilots and copilots, and the other flight personnel.[9] Under the weather explanation of lower Canadian airline productivity, the Canadian mainline and regional carriers should have higher percentages for these two categories than the U.S. carriers. It can be seen from Table 34, however, that the opposite is generally the case. Air Canada and CP Air have pilot and copilot percentages of 7.2 and 7.6 per cent compared with 10.0 to 13.0 per cent for the trunk and intrastate carriers.[10] Furthermore, the same contrary situation applies to other flight personnel -- 13.4 and 11.9 per cent for the Canadian mainline carriers compared with 14.5 to 18.4 per cent for the U.S. trunk and intrastate carriers.

While the differences in percentages are negligible between the regional and local service carriers, even their similarities tend to give rise to some doubt about the adverse effects of Canadian weather on employee productivity. The pilot and copilot percentages for the five regional carriers ranged from 10.5 to 15.0 per cent, compared with 11.8 to 13.7 per cent for the four local service carriers (and 10.5 to 13.0 per cent for the intrastate carriers). It is relevant that Eastern Provincial, Pacific Western and Transair, the three regional carriers carrying the majority of their traffic in domestic operations (see Table 6), had the lowest pilot and copilot percentages (10.5, 12.0 and 13.1), which were essentially identical to those of the local service carriers. In contrast, Nordair and Quebecair, with their largely transborder and international services, had pilot and copilot percentages of 14.7 and 15.0. Also, these were the two Canadian carriers whose outputs per employee were consistently above the trend lines of Figures 8 and 9. These two facts imply that their higher percentages for pilots and copilots were due not to adverse Canadian weather but to the use of relatively fewer non-flying personnel than the other regional carriers. Whether this resulted from greater efficiency, from greater purchases of outside ground services or from other factors is not known. The fact that Northwest had the highest percentage of pilots and copilots among the trunk carriers is consistent with the efficiency explanation, but the low percentage for Southwest (the most productive of the intrastate carriers) is not.[11]

Table 34

Percentage Distribution of Number of Employees by Category[a]
Canadian Mainline, Regional and Selected U.S. Carriers,
1975-78 Average Values

Carrier	Percentage of Total System Employees (1975-78 Average)					
	Pilots & Copilots	Other Flt. Personnel	Maint. Labour	Aircraft & Traffic Servicing	General Mgt.	Other Employees
Mainline						
Air Canada	7.2%	13.4%	15.2%	36.4%	0.6%	27.2%
CP Air	7.6	11.9	15.9	26.2	1.1	37.3
Trunk						
Trans World	10.0	14.5	17.4	33.8	0.1	24.2
Northwest	12.6	18.4	10.9	40.9	0.4	16.8
Delta	10.3	15.0	12.1	51.1	0.2	11.2
Intrastate						
Air Calif.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Air Florida	11.0	16.5	10.0	41.5	9.0	12.0
PSA	13.0	17.0	15.0	39.9	3.0	12.1
Southwest	10.5	16.6	9.4	51.3	4.5	7.7
Regional						
East. Prov.	10.5	15.5	29.8	29.5	3.3	11.4
Nordair	14.7	14.8	19.6	25.3	2.9	22.7
Pac. Western	12.0	11.9	21.2	36.8	17.3	0.8
Quebecair	15.0	16.4	16.7	27.9	17.2	6.8
Transair	13.1	13.2	22.2	20.1	14.2	17.2
Local Service						
Allegheny	11.8	11.2	14.3	46.9	0.5	15.3
Frontier	13.7	10.4	17.1	39.8	1.1	17.9
N. Central	13.6	11.4	14.4	43.5	0.4	16.7
Southern	12.6	10.7	9.3	44.4	0.9	22.1

Sources: Calculated from data in Appendix I

[a]See the notes to Tables I.1 and I.2 for the definitions of these categories.

The percentages for other flight personnel for the five regional carriers provide the only case that is partially consistent with the weather explanation regarding lower Canadian labour productivity. These percentages ranged from 11.9 to 15.5 for the regional carriers in comparison with only 10.4 to 11.4 per cent for the local service carriers. However, the intrastate carriers' range was from 16.5 to 17.0 per cent, which is not consistent with the weather explanation. One possible reason for the regional carriers' larger percentages over the local service carriers is their large charter operations. The cabin attendant requirements for long-haul charter services may be greater than the requirements for short-haul local service operations.[12]

The obverse comparison, utilizing the general management and other employees categories that generally work indoors, is consistent with the conclusion derived from the comparisons of flight personnel. Since there appears to be some difference of opinion among the Canadian carriers on how to allocate personnel among the general management and other employees categories (compare the percentages for Eastern Provincial and Nordair with those for Pacific Western, Quebecair and Transair; and Air Canada with CP Air), it seems desirable to aggregate these two categories and analyze the resulting combined percentages. Instead of Air Canada and CP Air having relatively small percentages for these combined categories, their 27.8 and 38.4 per cent shares were both larger than the 11.4 to 24.3 per cent shares for the trunk carriers and the 12.2 to 21.0 per cent shares for the intrastate carriers. Similarly, the five regional carriers' combined shares ranged from 14.7 to 31.4 per cent, with three of these carriers exceeding the local service carriers' range of 15.8 to 23 per cent.

Overall, these comparisons of employee category percentages do not support the explanation that adverse weather is an important reason for the lower output per employee of the majority of Canadian carriers. This, of course, is consistent with the findings of all the previous analyses in this chapter.

Summary

Both the direct and the indirect evidence presented in this chapter challenge the statement that weather is an important reason for Canadian carriers to have higher operating costs than U.S. carriers. Actually, similarities, rather than differences, characterized the performances of the federally-regulated airlines of the two countries during the period studied. Furthermore, the only weather factor that had a small, but statistically significant, relationship with operating expenses per RTM as well as with RTM per employee (after adjusting for the effects of distance) was the percentage of time carriers experienced below Category I minimums. With regard to this factor, however, the U.S. intrastate carriers experienced about the same conditions as the CAB-regulated airlines plus three of the seven Canadian carriers.

The indirect evidence concerning the distribution of employees among outdoor and indoor jobs is particularly persuasive. Labour is the input accounting for the largest portion of airline costs and it plays a crucial role in airline operations. Surely, if adverse weather serves to increase airline costs it should be evident in the distribution of employees among outdoor and indoor jobs. Yet no indication of this could be found. To the contrary, just the opposite distribution of employees from that expected was found to exist for Air Canada and CP Air relative to the trunk carriers, while the distribution for the regional carriers was very similar to that of their local service counterparts despite differences in weather. Clearly, one must look for reasons other than weather to explain why the performance of the Canadian carriers differed so markedly from that of the low-cost U.S. intrastate carriers.

Footnotes

1. Headwinds may be an unavoidable enroute weather condition for airlines that prolong flights and increase costs. But a headwind for one flight is a tailwind for another flight traveling in the opposite direction. Thus, the net effects of wind on carrier costs are probably small.

2. A more accurate average measure of weather effects would be obtained by weighting the observations at each airport by the number of aircraft movements for each carrier. However, aircraft movement information is not published for Canadian carriers by airport and, therefore, it is not possible to calculate weighted averages at this time. Also, it should be recognized that these averages exclude airports served by the various carriers in countries other than Canada and the United States. If a majority of these international destinations are located in milder climates than North America, the system simple averages would be somewhat lower than the North American averages given in Table 33.

3. Some airports and carriers have instrumentation that allows Category II operations (minimums at or above 100 foot ceiling and one-quarter mile visibility), while other airports require minimums higher than those for Category I. However, Category I minimums are those in effect at most major North American airports (telephone conversation with Mr. Donald Sinclair, Superintendent of Air Carrier Operations, Transport Canada, Toronto, June 19, 1980).

4. Mean annual precipitation (rain plus snow) was also investigated, but little difference existed in this factor between the federally-regulated Canadian and U.S. airlines (a simple average of 31.4 inches per year for Canadian carriers, versus 35.1 inches for U.S. carriers, with very similar overall ranges). Also, there was essentially no correlation between this factor and RTM per employee adjusted for passenger trip length.

5. A review of the source material reveals that below minimum conditions generally vary in a consistent pattern throughout the day, with the below minimum percentages generally being higher from midnight to 7 a.m.

than during the remainder of the day. Since the majority of takeoffs and landings occur during this latter period (from 7 a.m. to midnight), the percentages of below minimum conditions actually faced by the carriers are less than those specified. Furthermore, to the extent that aircraft operations in Canada are more frequent at major centres located in the southern part of the country having a less severe climate, calculating weighted averages for each carrier (using the number of its aircraft movements at each airport as weights) would further reduce the overall annual average. For example, weighting Air Canada's Canadian Category I minimum percentages by the total movements of all airlines at its airports (on the assumption that Air Canada is the major carrier at most of these airports), reduces its average Canadian percentage from 2.7 to 1.9 per cent. Thus, it should be realized that the percentages in Table 33 indicate relative differences among the airlines rather than absolute differences. A similar bias exists with regard to temperatures. Obviously, the daytime minimum winter temperatures and maximum summer temperatures are also higher than the overall averages listed in the table.

6. Based on the lowest mean squared error, the best-fit regressions were obtained from the following equations:

Snowfall:	$Y = 82.371 + 165.093/X$,	$R^2 = .020$
Category I Minimums:	$Y = 82.659 + 2.879X$,	$R^2 = .006$
Minimum Temperatures:	$Y = 88.825 - 9.523/X$,	$R^2 = .047$
Maximum Temperatures:	$Y = 31.899 + 0.717X$,	$R^2 = .065$

None of the R^2 are significant at the five per cent level (see footnote 3, Chapter III).

7. Based on the lowest mean squared error, the best-fit regressions were obtained from the following equations:

Snowfall:	$Y = -5.169 + .089X$,	$R^2 = .165$
Category I Minimums:	$Y = -10.388 + 7.240X$,	$R^2 = .299$
Minimum Temperatures:	$Y = 1.527 - .092X$,	$R^2 = .021$
Maximum Temperatures:	$Y = -11.003 + 833.311X$,	$R^2 = .020$

Only the R^2 for Category I minimums is significant at the five per cent level (see footnote 3, Chapter III).

8. Based on the lowest mean squared error, the best-fit regressions were obtained from the following equations:

Snowfall:	$Y = 2{,}965.729 - 37.645X$,	$R^2 = .050$
Category I Minimums:	$Y = 8{,}850.579 - 5{,}554.321X$,	$R^2 = .298$
Minimum Temperatures:	$Y = -302.373 + 4{,}440.765X$,	$R^2 = .135$
Maximum Temperatures:	$Y = 14{,}581.717 - 1{,}045{,}575.938/X$,	$R^2 = .055$

Only the R^2 for Category I minimums is significant at the five per cent level (see footnote 3, Chapter III).

9. Another advantage of these two categories is that the definitions of the employees to be included are unambiguous and, therefore, less subject to errors of categorization or to differences in interpreting the instructions of Statistics Canada or the CAB.

10. Since these carriers all operate with the same size cockpit crews for any given aircraft type, these percentages are not influenced by that factor. For example, in each case two pilots (rather than three) are used to operate two-engine aircraft.

11. Southwest's low percentage of pilots and copilots may be due to two factors. First, Southwest allows only ten minutes for ground time for all but terminating flights, and it staffs its stations accordingly. Its 51.3 per cent for the aircraft and traffic servicing employee category probably reflects this practice. Second, during these years it operated only Boeing 737-200 aircraft with two-man crews. Air Florida and PSA, in contrast, operated some or all of their service with Boeing 727s and Electras, requiring three-man crews.

12. Collective agreements for Eastern Provincial and Pacific Western specify a complement of four, rather than three, flight attendants on charter flights operated with Boeing 727 and 737 aircraft ["Agreement No. 1 Between Eastern Provincial Airways (1963) Ltd. and the Canadian Air Line Employees' Association (Flight Attendants)," effective Nov. 1, 1975, p. 6 and "Agreement No. 12 Between Pacific Western Airlines Ltd. and the Canadian Air Lines Flight Attendants Association," effective Oct. 1, 1978, p. 58].

Chapter XI

POPULATION AND AIRLINE COSTS

Population is a proxy for traffic demand. Airlines serving areas of low population are generally expected to have lower demand for their services than carriers serving heavily populated areas. Of course, population is just one factor affecting overall demand for airline services. Others include per capita income; the availability of alternative means of transportation (the highway system, railroads and water transport); an area's isolation relative to other population centres, or its proximity to another city having superior/inferior airline service; and the economic characteristics of the area (institutional, marketing, balanced or industrial economies).[1]

In addition to demand factors, traffic is also influenced by prices. Given two cities with identical population and other demand factors, if the fares and rates per mile available at one are appreciably lower than at the other, it will have more traffic (the first law of demand in economics).

Per Capita Traffic

To provide an overall perspective regarding population and traffic generation, Table 35 lists 1970/71 populations, 1978 scheduled revenue origin and destination (O&D) passengers, and the number of carriers operating large aircraft. This information covers the two countries in total and the 110 top metropolitan areas in North America (based on O&D passengers).[2] The population data show the well-known fact mentioned by Mr. Hunnings (see p. 131) that the 1971 population of Canada was 10.5 per cent of the 1970 U.S. population. In addition, Canada's total domestic and transborder O&D passenger volume in 1978 was 10.9 per cent of the U.S. These two percentages imply a slightly greater generation of traffic in Canada than in the United States, and this is supported by the O&D passengers per 1,000 population figures in Table 35. This implication is, however, due to using 1970/71 population data with 1978 traffic data. Total country population estimates for 1978 show that Canada grew somewhat faster than the United States so that by 1978 its population was 10.7 per cent of the United States, and the number of passengers per 1,000 population for the two countries were almost identical -- 1,726 for Canada vs. 1,705 for the United States.[3] The use of 1970/71 population data in Table 35 is dictated by the need to have reliable figures for the various metropolitan areas in addition to national totals.

One significant difference between Canada and the United States is the relative importance of transborder travel to the two countries. For Canada, 1978 transborder O&D passengers accounted for 36.1 per cent of its North American total while the same passengers comprised just 3.9 per cent of the U.S. total. This means that Canada's generation of domestic traffic

Table 35

Population, O&D Passengers and Number of Carriers for Canada and the U.S. and for the Top 110 Metropolitan Areas Served by Canadian Level I & II and U.S. Trunk, Local Service & Intrastate Carriers

Country Metropolitan Area[a]	1970/71[b] Population (000)	1978 O&D Passengers[c] Total (000)	1978 O&D Passengers[c] Per 1,000 Population	Number of Carriers[d] Canadian	Number of Carriers[d] U.S.
Canada-Domestic	-	25,881[e]	1,200	7	0
Transborder	-	14,646[f]	679	4	10[g]
Total	21,569	40,527	1,879	7	10
U.S. - Domestic	-	357,949	1,747	0	23
Transborder	-	14,646	72	4	10[g]
Total	204,878	372,595	1,819	4	23[h]
New York/Newark	16,183	30,230	1,868	1	33[i]
Los Angeles[j]	7,050	23,167	3,286	2	18[i]
Chicago	6,978	19,606	2,810	1	16[k]
San Fran./Oakland[j]	3,109	16,998	5,467	2	21[k]
Washington	2,861	11,399	3,984	0	21[k]
Dallas/Ft. Worth[j]	2,318	10,742	4,634	1	9[k]
Boston	2,750	9,292	3,379	1	10
Atlanta	1,386	8,801	6,350	0	10
Miami[j]	1,268	8,626	6,803	1	13
Houston[j]	1,985	8,566	4,315	1	11[k]
Denver	1,230	8,107	6,591	0	11
Detroit	4,204	7,655	1,821	0	12
TORONTO	2,602	7,547	2,900	3	5
Philadelphia	5,324	6,402	1,202	0	10
San Diego[j]	1,358	5,551	4,088	0	9
Seattle	1,425	5,506	3,864	1	9
Minneapolis/St. Paul	1,814	5,432	2,994	0	9
St. Louis	2,363	5,331	2,256	0	9
Las Vegas	283	5,130	18,127	0	10
Tampa/St. Petersburg[j]	1,012	5,086	5,026	1	10
Honolulu	770[l]	5,054	6,564	1	8
Pittsburgh	2,401	5,045	2,101	1	6
Ft. Lauderdale[j]	620	4,840	7,806	0	11
Phoenix	969	4,784	4,937	0	7
Cleveland	2,064	4,713	2,283	1	8
MONTREAL	2,729	4,532	1,661	7[k]	4
New Orleans	1,046	4,140	3,958	0	9
Orlando[j]	428	4,049	9,460	0	5
VANCOUVER	1,082	3,829	3,539	3	2
Kansas City	1,256	3,824	3,045	0	9
San Jose[j]	1,065	3,249	3,051	0	10
Portland, OR	1,007	3,173	3,151	0	8
Baltimore	2,071	2,687	1,297	0	8
Sacramento[j]	804	2,592	3,224	0	6
Hartford/Springfield	1,194	2,577	2,158	0	6

Table 35 (continued)

Country Metropolitan Area[a]	1970/71[b] Population (000)	1978 O&D Passengers[c] Total (000)	1978 O&D Passengers[c] Per 1,000 Population	Number of Carriers[d] Canadian	Number of Carriers[d] U.S.
Indianapolis	1,112	2,568	2,309	0	6
Memphis	770	2,532	3,288	0	10
Cincinnati	1,384	2,526	1,825	0	7
San Antonio[j]	864	2,483	2,874	0	6
CALGARY	403	2,451	6,082	3	2
Salt Lake City	558	2,404	4,308	0	6
Buffalo	1,349	2,399	1,778	0	4
Columbus, OH	916	2,266	2,474	0	8
Santa Ana/Anaheim[j]	1,421	2,225	1,566	0	2
EDMONTON	496	2,223	4,482	3	3
Milwaukee	1,404	2,174	1,548	0	7
Nashville	541	1,934	3,575	0	8
Reno[m]	121	1,845	15,248	0	5
Ontario/San Ber.[j]	1,141	1,805	1,582	0	8
Oklahoma City	642	1,774	2,763	0	5
Louisville	827	1,703	2,059	0	7
Dayton	852	1,701	1,996	0	6
OTTAWA/HULL	620	1,681	2,771	3	1
West Palm Beach[j]	349	1,675	4,799	0	5
Albuquerque	316	1,656	5,241	0	4
Charlotte	409	1,651	4,037	0	5
Tulsa	475	1,647	3,467	0	7
Jacksonville[j]	529	1,578	2,983	0	4
Rochester, NY	883	1,572	1,780	0	3
Norfolk	681	1,563	2,295	0	4
El Paso[j]	359	1,469	4,092	0	4
WINNIPEG	550	1,467	2,667	3	3
Syracuse	637	1,465	2,300	0	3
Omaha	540	1,433	2,654	0	7
Austin[j]	296	1,429	4,828	0	4
Tucson	352	1,418	4,028	0	5
Raleigh/Durham[m]	419	1,365	3,258	0	4
Birmingham	739	1,328	1,797	0	4
Albany	722	1,136	1,573	0	3
Des Moines[m]	286	1,100	3,846	0	5
Greensboro/High Pt.	605	1,054	1,742	0	5[k]
Fresno[j]	413	1,015	2,458	0	4
Spokane	287	1,013	3,530	0	4
Wichita	389	982	2,524	0	5
Little Rock	323	981	3,037	0	5
Richmond[m]	518	946	1,826	0	3
Providence	911	931	1,022	0	5
HALIFAX	251	917	3,653	2	0
Lubbock[j]	179	906	5,061	0	4
Rio Grande Valley[j,n]	337	853	2,531	0	4[i]

(cont.)

Table 35 (continued)

Country Metropolitan Area[a]	1970/71[b] Population (000)	1978 O&D Passengers[c] Total (000)	1978 O&D Passengers[c] Per 1,000 Population	Number of Carriers[d] Canadian	Number of Carriers[d] U.S.
Knoxville	400	820	2,050	0	5
Charleston, SC	304	806	2,651	0	4
Sarasota/Bradenton[m]	218[o]	783	3,592	0	2
Midland/Odessa[j]	158	773	4,892	0	3
Jackson/Vicksburg	304	761	2,503	0	3
Columbia, SC	323	759	2,350	0	4
Boise[m]	112	750	6,696	0	2
Grand Rapids	539	743	1,378	0	2
Shreveport	294	717	2,439	0	3
Corpus Christi[j]	285	670	2,351	0	4
Anchorage	126	667	5,294	0	5
Harrisburg/York	740	626	846	0	2
QUEBEC	501	624	1,246	3	0
Toledo	692	619	895	0	4
Savannah	188	619	3,293	0	2
Madison	290	618	2,131	0	3
Daytona Beach[j]	169	599	3,544	0	3
Mobile/Pascagoula	377	596	1,581	0	3
Lexington	174	591	3,397	0	4
Ft. Myers[m]	105	588	5,600	0	2
Moline/Davenport[m]	363	587	1,617	0	2
Greenville/Spartanburg	473	586	1,239	0	3
Monterey/Salinas[j]	247	580	2,348	0	4
Lake Tahoe[j]	44	577	13,114	0	2
Tallahasse[j]	103	556	5,398	0	4
Chattanooga	307	552	1,798	0	4
Colorado Springs	236	542	2,297	0	3
VICTORIA	196	537	2,740	2	0
Amarillo[j]	144	535	3,715	0	5[p]
Allentown/Bethlehem	544	534	982	0	3

Sources: CAB (k), vol. XI-4-1 and (p), 1979, pp. 105-6; CAB/FAA, 1978, Table 6; U.S. Dept. of Commerce, 1973, vol. 1, Part 1; SC, 1977, vol. 1; SC(ASC) (d), Table 4, Appendix 4 and (e), 1978, Table 4, Appendix 4

[a]Census Metropolitan Areas for Canada and Standard Metropolitan Statistical Areas (SMSAs) for the United States (except for Chicago and New York/Newark which are Standard Consolidated Areas comprised of two or more SMSAs and, in the case of New York/Newark, two additional counties)

[b]Data from the 1971 census for Canada and the 1970 census for the United States

Table 35 (continued)

[c]Obtained from a 10-per cent sample of passenger flight coupons lifted by the Canadian mainline and regional carriers and by all U.S. certificated carriers except helicopter and intra-Alaska carriers. In addition, this includes O&D passengers for the four intrastate carriers based on their internal reports. The sample covers passengers from domestic, domestic portion of international, transborder and transborder portion of international trips. O&D passengers are counted twice in the country totals and wherever both metropolitan areas served by an airport pair are listed in this table. Therefore, the number of passengers actually traveling equals exactly half of the country totals and approximately half of each area's total.

[d]Number of Canadian mainline and regional carriers and the number of U.S. trunk, local service and intrastate carriers operating jet aircraft during 1978. Excludes airlines serving a metropolitan area in the United States for one or two months at the end of 1978, usually as the result of new entry permitted by the Airline Deregulation Act of 1978.

[e]Domestic plus domestic portion of international trips

[f]Transborder plus transborder portion of international trips

[g]In addition, Wein Air Alaska operated a transborder service between Canada and Alaska.

[h]Eleven U.S. trunk, eight local service and four intrastate carriers

[i]Service provided through three airports. A carrier serving two or three of these airports is counted two or three times.

[j]Served by an intrastate carrier

[k]Service provided through two airports. A carrier serving both airports is counted twice.

[l]Population of the entire state of Hawaii since Honolulu is the central airport for the state. The population of the Honolulu SMSA was 629(000). The Hawaiian airports of Kahului, Lihue, Hilo and Kona have been excluded from this table. Their 1978 O&D passenger volumes were 1,536(000), 1,273(000), 746(000) and 542(000), respectively.

[m]This area was not served by one of the selected U.S. carriers studied in this report.

[n]Includes the cities of Brownsville, Harlingen and McAllen, all located at the extreme southern tip of Texas and each having its own airline airport. Harlingen (in the middle) is about 35 miles via interstate highway from the other two airports. It has the largest passenger volume (523,000) and is served by both Southwest and Texas International. The populations of three adjacent counties have been totaled for the three airports.

[o]Population of two adjacent counties since neither city is part of a SMSA

[p]Includes Southwest which inaugurated service on December 12, 1978

per 1,000 population was appreciably lower than in the United States -- 1,102 for Canada vs. 1,638 for the United States (based on 1978 population data).

Not surprisingly, 10 of the top 110 metropolitan areas listed in Table 35 are Canadian -- ranked 13, 26, 29, 40, 45, 53, 62, 78, 93 and 108. These 10 are among the 13 Canadian Census Metropolitan Areas having the largest 1971 populations.[4] Six of them received transborder service by both Canadian and U.S. carriers (Toronto, Montreal, Vancouver, Calgary, Edmonton and Winnipeg), while one (Ottawa/Hull) had transborder service by a Canadian carrier. Only Quebec City lacked transborder service by a large carrier, but it did receive such service from Bar Harbor Airlines, a U.S. commuter carrier (OAG, July 1 and Dec. 1, 1978).

During 1978, a total of 104 Canadian points were served by one or more of the larger Canadian carriers through 106 airports, while a total of 400 points were served by large U.S. carriers through 412 airports.[5] On a nationwide basis, this yields an average 1978 population per airport of only 222,000 for Canada compared with 530,000 for the United States. The converse of this is that, in order to achieve the same 1.07 to 10 ratio between airports that existed between populations, the large U.S. carriers would have had to provide service to about 1,000 airports in the United States. Relative to population, therefore, the coverage of large Canadian carriers has been much more extensive than that of large U.S. carriers.

The story differs with respect to geographic coverage. The two countries are similar in overall size (3,851,809 square miles for Canada vs. 3,675,633 for the United States -- from Cosmopolitan World Atlas, 1962, p. 167); yet the United States has four times the number of airports served by large airlines. Also, the top 10 Canadian metropolitan areas (in terms of O&D passengers) accounted for 43.7 per cent of total 1971 population and 63.7 per cent of total 1978 O&D passengers, while the top 10 U.S. metropolitan areas accounted for 22.4 per cent of total population and 39.6 per cent of total O&D passengers. This merely reflects the obvious fact that, within its large geographic area, Canada's population, traffic and airline coverage are more concentrated than in the United States, with most of the Canadian population settled in the more temperate regions along the Canada/U.S. border.

An idea of whether or not the large Canadian metropolitan areas differed appreciably from U.S. areas in terms of per capita traffic generation can be obtained by taking the two U.S. areas (out of the top 100) with populations closest to each of the top 10 Canadian areas, and then comparing the averages for the 10 Canadian areas with those for the 20 U.S. areas. The 10 Canadian areas had an average 1971 population of 943,000 and 1978 traffic of 2,581,000 O&D passengers, yielding 2,737 passengers per 1,000 population. The 20 U.S. areas had an average 1970 population of 931,000 and 1978 traffic of 2,808,000 O&D passengers, or 3,015 passengers per 1,000 population.[6] This means that the top 10 Canadian areas generated about nine per cent fewer North American passengers per 1,000 population than comparable

(in terms of population) U.S. areas. They also generated 15 per cent fewer passengers per 1,000 than the 3,215 generated by the 10 largest U.S. areas (New York/Newark through Houston).

The areas surrounding the remaining 94 points in Canada had an estimated 1971 population totaling 3,633,000, yielding a generation of 4,051 passengers per 1,000 population -- 48 per cent higher than that of the top 10 metropolitan areas.[7] Of course, these per capita figures are affected by the population actually supporting each airport, and by the related role that small airlines play in feeding/receiving connecting passengers to/from the large airlines. However, they indicate that the smaller Canadian areas do generate more traffic per capita than the larger areas. In addition, since the overall per capita generation for all of Canada is slightly higher than for the United States (opposite to that for the top 10 metropolitan areas), it follows that smaller Canadian points also generate higher per capita traffic than do their U.S. counterparts. This implies that Canadian airline traffic is somewhat less concentrated than Canadian population, and that the traffic differences at various airports in the two countries are slightly less than population differences.

Total Population

The simplest approach to investigating whether or not differences in operating costs between Canadian and U.S. carriers are affected by differences in population is to compare these carriers in terms of the aggregate 1970/71 populations surrounding the airports served by each carrier, that is, the population pool from which most traffic originates. These population totals for each carrier are given in Table 36, broken down between areas located in Canada and those in the United States. It can be seen that the total populations of Air Canada and CP Air were heavily influenced by the populations of the metropolitan areas they served in the United States. Even with the U.S. populations added to those in Canada, however, the 1970/71 population pool available to Air Canada (51,634,000) was just two-thirds of Trans World's pool (76,097,000), while CP Air's population pool (19,539,000) was only 30 per cent of Northwest's (66,083,000). Similarly, the population pools of the Canadian regional carriers were all very much smaller than those of the U.S. local service carriers.

If the Canadian carriers had consistently inferior operating expenses and employee productivity than comparable U.S. carriers, these relative population data would support the assertion that an inverse relationship exists between population and operating costs. However, Tables 5 and 16 show this was not the case. The distance-related trend line for operating expenses per RTM in Table 5 is heavily influenced by the very low values for Northwest and Pacific Western so that 10 of the 14 deviations are positive. Within that framework, the 4.2 and 1.6 per cent positive deviations for Air Canada and CP Air lie within the -19.2 to 7.0 per cent deviations for the U.S. trunk carriers, and the range determined by the Canadian regional carriers encompasses the deviations of the U.S. local service carriers. In terms of RTM per employee (Table 16), both Canadian mainline car-

Table 36

Population, Number of Airports and Number of Carriers Serving All Airports on the North American Route Systems of the Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	1970/71 Population (000)			Number of Airports in			Number of Carriers in		
	Canada	U.S.	Total	Canada[a]	U.S.[a]	Total	Canada[b]	U.S.[b]	Total
Mainline									
Air Canada	11,524	40,110	51,634	33/32	17/10	50	69/21	12/139	241
CP Air	8,610	10,929	19,539	17/15	6/ 3	23	38/22	4/ 39	103
Trunk									
Trans World	0	76,097	76,097	-	41/38	41	-	11/347	358
Northwest	1,046	65,037	66,083	3/ 2	40/36	43	7/ 6	12/280	305
Delta	2,729	87,483	90,212	2/ 1	78/73	80	6/ 4	12/451	473
Intrastate									
Air Calif.	0	9,603	9,603	-	11/11	11	-	2/ 70	72
Air Florida	0	4,905	4,905	-	11/11	11	-	2/ 63	65
PSA	0	15,523	15,523	-	13/13	13	-	4/ 85	89
Southwest	0	6,782	6,782	-	13/ 9	13	-	2/ 49	51
Regional									
East. Prov.	3,831	0	3,831	18/17	-	18	34/ 4	-	38
Nordair	4,641	2,401	7,042	16/15	1/ 1	17	32/ 5	1/ 6	44
Pac. Western	2,622	1,425	4,046	36/36	1/ 1	37	49/ 8	1/ 9	67
Quebecair	3,680	0	3,680	18/18	-	18	32/ 4	-	36
Transair	3,417	0	3,417	20/20	-	20	31/10	-	41
Local Service									
Allegheny	5,331	70,412	75,743	3/ 2	58/56	61	9/ 9	5/280	303
Frontier	550	23,652	24,202	1/ 1	87/85	88	3/ 3	2/228	236
N. Central	3,267	49,858	53,125	3/ 3	72/70	75	8/ 9	4/231	252
Southern	0	50,171	50,171	-	59/56	59	-	4/287	291

Sources: CAB/FAA, 1978, Table 6; U.S. Dept. of Commerce, 1973, vol. 1, Part 1; Consumer and Corporate Affairs Canada, 1980, pp. 27-40; OAG, July 1 and Dec. 1, 1978; SC, 1977, vol. 1; SC(ASC) (c) and (g)

[a]The first number of each pair is the total number of airline airports located within the areas containing the specified population. The second is the number of those airports actually served by the carrier. Totals sum only the first of these numbers. Data are for 1978.

[b]The first number of each pair is the number of Canadian carriers serving the total number of airline airports. The second is the number of U.S. carriers serving these airports. Every carrier is counted once at each airport served, yielding "airport carriers." Totals sum all carriers operating at the airports in both countries. Data are for 1978.

riers were lower than the U.S. trunk carriers relative to the distance-related trend line, but this pattern did not apply to the regional and local service carriers. Finally, Nordair and Quebecair were similar to Trans World and Delta in RTM per employee despite large differences in total populations.

Population data for the U.S. intrastate carriers provide an even more serious challenge to the assertion that an inverse relationship exists between population and operating costs. The intrastate carriers' 1970 population pools ranged from 4,905,000 (Air Florida) to 15,523,000 (PSA). These totals were considerably smaller than the totals for Air Canada and CP Air, and they encompassed the mainline carriers' domestic (Canada only) population pools. Yet, as shown in Tables 5 and 16, the intrastate carriers had much lower operating expenses per RTM and produced appreciably more RTM per employee than any of the other carriers (except Northwest) -- all in relation to the distance-related trend lines. If total population were a major factor affecting airline operating costs, the intrastate carriers would not have been so superior in these measures.

There were similar anomalies within each carrier group. CP Air's population pool was only 38 per cent as large as Air Canada's, but relative to the distance-related trend lines its operating expenses per RTM (Table 5) and its RTM per employee (Table 16) were slightly superior to Air Canada's. Northwest had the lowest operating expenses and highest employee productivity of the three U.S. trunk carriers; yet it also had the lowest population pool. The most efficient of the intrastate carriers, Southwest, had the second smallest population pool -- one that was only 44 per cent as large as PSA's pool. Furthermore, there was no consistent relationship between the various regional carriers' population pools and their operating expense and employee productivity performances; and the same lack of consistency applied to the four U.S. local service carriers.

Finally, the best-fit regressions relating the following dependent and independent variables for the federally-regulated airlines (from Tables 5, 16 and 36) yield statistically insignificant R^2 ranging from .169 down to under .001:[8]

1. Total operating expenses per RTM and
   a. North American population pool
   b. Domestic population pool[9]
2. Deviations in total operating expenses per RTM from the distance-related trend line and
   a. North American population pool
   b. Domestic population pool[9]
3. Deviations in total RTM per employee from the distance-related trend line and
   a. North American population pool
   b. Domestic population pool[9]

In addition, in a third of the cases the slopes of the regressions are inconsistent with the predicted relationships between population pool and the dependent variables. All of the above evidence questions the importance of population as a significant factor influencing airline operating costs.

Population per Airport

It can be argued that population per airport, rather than the total population pool available to a carrier, is the relevant population factor affecting airline operating costs. Population per airport indicates how population is distributed over a carrier's system, and it could well be that a relatively small population served through a few airports yields the same population per airport as a much larger population served through many more airports. Were this the case, and if operating costs were closely related to population per airport, then both carriers' operating costs would be similar. Population per airport data for each carrier are given in Table 37 and were calculated by dividing the 1970/71 population pools for each carrier by the total number of airline airports located in the relevant areas during 1978.

Again, Air Canada and CP Air were appreciably below Trans World and Northwest in total population per North American airport, with each Canadian carrier now being about 55 per cent of its comparable U.S. carrier. Also, with one exception, the Canadian regional carriers had lower populations per airport than the U.S. local service carriers. Given these similar relationships, it follows that the inconsistencies between total population pool and operating expenses per RTM and employee productivity should also hold for population per airport among the federally-regulated carriers. At the same time, the outstanding performance of the U.S. intrastate carriers continues to pose a problem to the assertion that population per airport affects operating costs. The total populations per airport of the intrastate carriers were roughly equal to, or less than, those of the Canadian mainline carriers and, in two cases, were similar to the mainline carriers' domestic populations per Canadian airport. Yet the intrastate carriers had much superior operating expenses and employee productivity.

Finally, the best-fit regressions relating the three dependent variables with each carrier's total North American and domestic populations per airport (as two separate independent variables), yield R^2 ranging from .128 to .035.[10] Again, none of the R^2 are significant at the five per cent level and a third of the regression slopes are inconsistent with the predicted relationships between population per airport and the dependent variables. Thus, the evidence continues to question the importance of population as a factor influencing operating costs.

Population per Airport Carrier

A third possibility is that an inverse relationship between population and airline operating costs can be found by using average population per carrier for all large carriers serving all airports within the relevant

Table 37

Population per Airport on the North American Route Systems of the Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	1970/71 Population per Airport[a]		
	Canada	U.S.	Total
Mainline			
Air Canada	349,000	2,359,000	1,033,000
CP Air	506,000	1,822,000	850,000
Trunk			
Trans World	0	1,856,000	1,856,000
Northwest	349,000	1,626,000	1,537,000
Delta	1,364,000	1,122,000	1,128,000
Intrastate			
Air Calif.	0	873,000	873,000
Air Florida	0	446,000	446,000
PSA	0	1,194,000	1,194,000
Southwest	0	522,000	522,000
Regional			
East. Prov.	213,000	0	213,000
Nordair	290,000	2,401,000	414,000
Pac. Western	73,000	1,425,000	109,000
Quebecair	204,000	0	204,000
Transair	171,000	0	171,000
Local Service			
Allegheny	1,777,000	1,214,000	1,242,000
Frontier	550,000	272,000	275,000
N. Central	1,089,000	692,000	708,000
Southern	0	850,000	850,000

Source: Calculated from data in Table 36

[a]Number of airports served in 1978

population pool. For example, Table 36 shows that Air Canada's North American system covered approximately 11,524,000 people located in areas served by 33 Canadian airports, and 40,110,000 people served by 17 U.S. airports, for a total population of 51,634,000. Including Air Canada, 90 large carriers (69 Canadian and 21 U.S.) provided service in 1978 at the 33 Canadian airports, and 151 large carriers (12 Canadian and 139 U.S.) served the 17 U.S. airports, making a total of 241 "airport carriers" serving all areas on Air Canada's North American system.[11] In essence, population per airport carrier indicates the average distribution of population over a carrier's system adjusted by the degree of competition/rivalry the carrier faces from other airlines. It is a rough indicator of the traffic available to a carrier at each airport on its system.

Table 38 gives both the population per airport carrier and the average number of carriers serving each airport located within the geographic areas associated with the indicated carrier's population pool. In 1978, the average numbers of carriers were generally two to three times higher at U.S. airports than at Canadian. Since each carrier serves many more airports in its own country than in the other, it follows that the population pool available to each U.S. carrier is divided into more parts than is the case for Canadian carriers. This tends to counteract the larger populations in the United States. Therefore, it is not surprising to find the total 1970/71 populations per airport carrier were almost the same among the Canadian mainline and U.S. trunk carriers, ranging from populations of 190,000 to 217,000 per airport carrier, and with Air Canada and Trans World being almost identical. The U.S. intrastate carriers were all lower than the mainline and trunk carriers, ranging from populations of 75,000 per airport carrier (Air Florida) to 174,000 (PSA). The Canadian regional carriers tended to be somewhat lower than the intrastate carriers in this measure, with populations per airport carrier ranging from 60,000 (Pacific Western) to 160,000 (Nordair). Finally, the U.S. local service carriers were divided into two subgroups. Allegheny (250,000) and North Central (211,000) were similar to the mainline and trunk carriers, while Frontier (102,000) and Southern (172,000) were more like the U.S. intrastate and Canadian regional carriers.

If population per airport carrier were a major determinant of airline operating costs, one would expect the similarities in this measure among the Canadian mainline and U.S. trunk carriers to yield similar operating expenses per RTM and employee productivity. However, after adjusting for distance, Table 5 shows that Northwest had appreciably lower operating expenses than its fellow carriers, and Table 16 shows its very much greater RTM per employee. Even more inconsistent differences are found when comparing the mainline and trunk carriers with the U.S. intrastate carriers. The latter carriers all have much lower operating expenses per RTM even though their populations per airport carrier were also much smaller. And, again, the patterns of populations per airport carrier for the Canadian regional and U.S. local service carriers do not follow the differences in operating expenses per RTM or employee productivity.

Table 38

Population per Airport Carrier and Average Number of Carriers per Airport on the North American Route Systems of the Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	1970/71 Population per Airport Carrier[a]			Average Number of Carriers per Airport		
	Canada	U.S.	Total	Canada	U.S.	Total
Mainline						
Air Canada	128,000	265,000	214,000	2.7	8.9	4.8
CP Air	144,000	254,000	190,000	3.5	7.2	4.5
Trunk						
Trans World	0	213,000	213,000	-	8.7	8.7
Northwest	80,000	223,000	217,000	4.3	7.3	7.1
Delta	273,000	189,000	191,000	5.0	5.9	5.9
Intrastate						
Air Calif.	0	133,000	133,000	-	6.5	6.5
Air Florida	0	75,000	75,000	-	5.9	5.9
PSA	0	174,000	174,000	-	6.8	6.8
Southwest	0	133,000	133,000	-	3.9	3.9
Regional						
East. Prov.	101,000	0	101,000	2.1	-	2.1
Nordair	125,000	343,000	160,000	2.3	7.0	2.6
Pac. Western	46,000	142,000	60,000	1.6	10.0	1.8
Quebecair	102,000	0	102,000	2.0	-	2.0
Transair	83,000	0	83,000	2.0	-	2.0
Local Service						
Allegheny	296,000	247,000	250,000	6.0	4.9	5.0
Frontier	92,000	103,000	103,000	6.0	2.6	2.7
N. Central	192,000	212,000	211,000	5.7	3.3	3.4
Southern	0	172,000	172,000	-	4.9	4.9

Source: Calculated from data in Table 36

[a]Total population pool for each carrier divided by the sum of all the large carriers serving each airport within the relevant areas during 1978

Turning once again to statistical inference, the best-fit regressions relating the three dependent variables with each carrier's total North American and domestic populations per airport carrier yield statistically insignificant R^2 ranging from .107 to .004 with half of the coefficient slopes being inconsistent with the predicted relationships.[12] So, again the evidence fails to support the argument that there is an important inverse relationship between population and airline operating costs.

Other Factors and Conclusion

It is important to recognize that all the carriers in this analysis operate jet aircraft that are large relative to the aircraft commonly operated by Level III, IV and V carriers in Canada, and by commuter and air taxi carriers in the United States. Therefore, implicit in the above comparisons is the fact that, regardless of local population, the traffic available at the various airports was sufficient to support the scheduled operation of jet aircraft. Thus, the costs of operating small aircraft at low-traffic generating airports are excluded and the conclusion of this section should not be applied to such operations.

Another factor is that traffic generation from a given local population can be affected by operating restrictions imposed under regulation. CP Air's capacity and long-haul restrictions on the transcontinental route during and prior to 1978 are one example; the restrictions imposed on Canadian regional and U.S. local service carriers against operating nonstop flights between major cities are another. The fact that CP Air carried only 28 per cent as many scheduled domestic RPM as Air Canada in 1978 (Table G.1), while having a domestic population pool 75 per cent as large, is probably due in large part to such restrictions. Despite its relatively low traffic generation, however, CP Air did as well or better than Air Canada in terms of operating expenses per RTM and employee productivity.

Not only have inconsistencies between population and operating costs within carrier groups failed to support the assertion of an important inverse relationship between these factors, but again and again the superior performance of the U.S. intrastate carriers has posed a fundamental challenge to the assertion. The small intrastate carriers served limited geographic areas where surface transportation has been much more competitive with air transportation than is the case for longer-haul routes. The total population pools available to Air California and PSA were much smaller than those available to Air Canada and CP Air, and were roughly comparable to the Canadian carriers' domestic pools. Yet these two intrastate carriers outperformed the Canadian carriers in terms of operating expenses per RTM and labour productivity. Similarly, Southwest's total population pool in Texas was smaller than even CP Air's domestic pool, its population per airport was about the same and its population per airport carrier was again smaller. The metropolitan areas it served were even comparable in population to those in Canada.[13] Yet, even with these population characteristics, Southwest achieved much lower operating expenses per RTM than CP Air.

Whether based on formal statistical inference or on individual comparisons between carriers, the evidence fails to support the assertion that there is an important inverse relationship between population and airline operating costs. Furthermore, there is no consistent indication that the operating costs of Canadian airlines differ from those of comparable U.S. carriers due to population differences. To the contrary, the evidence strongly indicates that population is not an important determinant of airline operating costs.

Summary

This chapter and the previous chapter have investigated the argument proposed by Canadian airline representatives that adverse weather and smaller population are two reasons why Canadian mainline and regional carriers have higher operating costs than their U.S. counterparts. First of all, it was pointed out that the performances of the federally-regulated airlines in the two countries were characterized by substantial similarities rather than differences, but that important differences did exist between all the federally-regulated airlines and the U.S. intrastate carriers. Second, neither weather nor population was found to have an appreciable impact on airline performance. Out of four measures of weather, only below Category I minimums proved to have a statistically significant relationship with distance-adjusted operating expenses per RTM and with distance-adjusted RTM per employee. However, since the U.S. intrastate carriers were about average with regard to this factor, their superior performance could not be attributed to especially favourable weather conditions. Then, as described in this chapter, no statistically significant relationships were found between three measures of population and the operating expense and employee productivity measures. Furthermore, inconsistencies between population and operating costs existed within the various carrier groups.

This evidence casts serious doubt on the arguments that bad weather and low population impose higher operating costs on Canadian carriers. It now seems incumbent on any who continue to make these arguments to present comprehensive evidence supporting their assertions. Until such evidence is forthcoming the opposite conclusion stands -- adverse weather and low population do not significantly increase the operating costs of large Canadian carriers.

Footnotes

1. For example, institutional cities such as Washington, Ottawa and Las Vegas generate more passengers per 1,000 population than do industrial cities such as Detroit and Montreal (FAA, 1963, pp. 1-10).

2. The scheduled revenue O&D passenger data pertain only to the Canadian mainline and regional carriers, and to the U.S. trunk, local service and intrastate carriers. They exclude O&D passengers traveling only on Level III, IV and V Canadian carriers and on U.S. commuter carriers. Thus, the Canadian data pertain mainly to those points lying on the transcontinen-

tal routes along the border plus the north-south routes operated by CP Air and the five regional carriers. In addition, these O&D passenger data exclude all charter passengers. In 1978, however, charter passengers accounted for only about 0.8 per cent of total domestic and transborder schedules and charter O&D passengers for U.S. carriers and 1.8 per cent for Canadian carriers. Therefore, there were not enough of them to change the relationships indicated by scheduled O&D passengers [calculated from data in Table 35, Appendix H and CAB (p), Nov. 1979, pp. 8-9].

3. In 1978, the Canadian population was approximately 23,483,000 while the U.S. population was 218,548,000 (Finance Canada, April 1980, p. 156; U.S. President, 1979, p. 213).

4. The other three large metropolitan areas are Hamilton, London and Windsor, Ontario. Hamilton's low traffic generation through its local airport is due in large part to its proximity to the excellent airline service available at Toronto. A similar situation exists for Windsor in relation to Detroit. London's poor showing is probably due to the majority of its service being provided by Great Lakes Airline, a Level III carrier excluded from the Canadian O&D survey.

5. CAB/FAA, 1978, Table 6; Consumer and Corporate Affairs Canada, pp. 27-40; OAG, July 1 and Dec. 1, 1978; and SC(ASC) (g). The U.S. totals exclude 16 points located in its territories and 173 points served only by intra-Alaska carriers.

6. The 20 U.S. metropolitan areas are Boston and Pittsburgh (for Toronto), Washington and St. Louis (for Montreal), Indianapolis and San Jose (for Vancouver), Charlotte and Knoxville (for Calgary), Richmond and Tulsa (for Edmonton), Ft. Lauderdale and Greensboro/High Point (for Ottawa/Hull), Salt Lake City and Nashville (for Winnipeg), Corpus Christi (in lieu of the unique Las Vegas) and Monterey/Salinas (for Halifax), Grand Rapids and Greenville/Spartanburg (for Quebec), and Sarasota/Bradenton and Savannah (for Victoria). See Table 35.

7. These figures were obtained from the same Canadian sources used in Table 35.

8. Based on the lowest mean squared error, the best-fit regressions were obtained from the following equations:

1.a. $Y = 87.113 - 3{,}161.324/X$, $R^2 = .000$
b. $Y = 89.512 - 21{,}609.266/X$, $R^2 = .015$
2.a. $Y = 2.188 - .000056X$, $R^2 = .045$
b. $Y = 2.003 - .000061X$, $R^2 = .053$
3.a. $Y = -1{,}633.086 + .066X$, $R^2 = .102$
b. $Y = -1{,}889.244 + .085X$, $R^2 = .169$

None of the R^2 are significant at the five per cent level (see footnote 3, Chapter III).

9. The use of domestic population pools as an independent variable responds to the possible argument that these data reflect more accurately the true demand for each carrier's services. After all, Canadian carriers in the United States (and U.S. carriers in Canada) are limited to only transborder operating rights in contrast to their more extensive domestic rights. Also, the transborder community of interest is probably less than the overall community of interest within each country. As can be seen above, the use of domestic population pools did not yield appreciably higher R^2.

10. Using population per airport in place of population pool, the best-fit regressions were obtained from the following equations based on the lowest mean squared error (see p. 153):

1.a. $Y = 96.110 - .012X$, $R^2 = .088$
b. $Y = 91.835 - .007X$, $R^2 = .035$
2.a. $Y = 1.679 - 611.178/X$, $R^2 = .035$
b. $Y = 2.812 - 842.663/X$, $R^2 = .120$
3.a. $Y = -1{,}423.954 + 3.057X$, $R^2 = .060$
b. $Y = -1{,}978.599 + 4.465X$, $R^2 = .128$

None of the R^2 are significant at the five per cent level (see footnote 3, Chapter III).

11. It should be clearly understood that each carrier is counted several times in this measure, once at every airport where it operates. Air Canada, for example, is counted 42 times because in 1978 it served 42 of the 50 airports within its population pool, leaving 199 airport carriers comprised of other large Canadian and U.S. airlines. The eight airports not served by Air Canada were: Edmonton Municipal, New York La Guardia, Chicago Midway, Dallas Love Field, Houston Hobby, Burbank, Long Beach and Oakland. It should also be understood that "large carriers" refers to the Canadian mainline and regional carriers, and to the U.S. trunk, local service and intrastate carriers.

12. Using population per airport carrier in place of population pool, the best-fit regressions were obtained from the following equations based on the lowest mean squared error (see p. 153):

1.a. $Y = 90.481 - .023X$, $R^2 = .004$
b. $Y = 81.178 + .038X$, $R^2 = .010$
2.a. $Y = 3.417 - 461.624/X$, $R^2 = .041$
b. $Y = 4.905 - 596.231/X$, $R^2 = .107$
3.a. $Y = -2{,}002.236 + 17.166X$, $R^2 = .054$
b. $Y = -3{,}338.508 + 28.183X$, $R^2 = .064$

None of the R^2 are significant at the five per cent level (see footnote 3, Chapter III).

13. The 1970 populations of Dallas-Ft. Worth and Houston were 2,318,000 and 1,985,000, respectively, compared with 1971 populations for Montreal and Toronto of 2,729,000 and 2,602,000. Southwest's smallest area, Amarillo, had a 1970 population of only 144,000 (see Table 35).

Chapter XII

GOVERNMENT OWNERSHIP

The previous chapters have demonstrated that very large differences in airline performance have been associated with regulatory monopolies in contrast to regulatory duopolies, and that these differences were not attributable to weather or population factors. Given the fact that the federal government owns all of Air Canada and most of Nordair (through Air Canada), and that Pacific Western is owned by the Alberta government, it is desirable to investigate whether or not significant performance differences have been associated with government ownership within the environment provided by a regulatory monopoly. Has government ownership been associated with higher or lower fares, productivity and operating expenses, or has there been little or no difference between government-owned and privately owned airlines in these factors?

In two articles, David G. Davies of Duke University compared the employee productivity of the two domestic Australian interstate carriers and attributed the observed differences to private versus government ownership [Davies (a) and (b)]. Using data for the 16-year period from 1958-59 to 1973-74 he concluded:

> The evidence indicates that the private firm (Ansett Airlines) operating under the rules and customs associated with exchangeable private property rights, is more productive than the public enterprise (Trans-Australia). [Davies (b), p. 226]

Let us see if Davies' conclusion is supported by performance differences between government-owned Air Canada on the one hand, and privately owned CP Air, Trans World, Northwest and Delta on the other. The performance of Nordair and Pacific Western in relation to the other Canadian regional and U.S. local service carriers will not be analyzed because of the 1975-78 time period covered by this study. Controlling interest in Nordair was not purchased by Air Canada until January 1979, while Alberta's purchase of Pacific Western in 1974 was opposed by the federal government and the final ruling allowing the acquisition was not issued by the Supreme Court of Canada until February 1977.[1] Therefore, it is doubtful that the full effects (if any) of government ownership would have had time to develop by 1978.

North American Evidence

It has already been shown that there were no differences in the fares per mile offered by Air Canada and CP Air during 1978 and earlier years, and that their economy fares per mile were very similar to the coach fares per mile of the U.S. trunk carriers. Thus, as in Davies' articles, the question of performance differences concerns productivity and related

operating costs. It has also been demonstrated that distance plays an important role in airline operating expenses, employee productivity and fuel utilization. Therefore, intercarrier efficiency comparisons should continue to be undertaken using performance data that have been adjusted for the effects of distance, that is, by using the percentage deviations from the distance-related trend lines for the various measures. These percentage deviations for Air Canada, CP Air, Trans World, Northwest and Delta are summarized in Table 39, with the airlines listed in decreasing rank order of efficiency for each of seven measures.

This table shows that Air Canada ranked relatively low (fourth or fifth) among these five large carriers in terms of employee productivity (RTM and operating revenues per employee) and employee expenses (total employee payments per RTM). In contrast to its relatively poor performance with regard to employees, however, Air Canada was the best of the five carriers in terms of fuel utilization and expenses, consistently ranking first in these three measures while Trans World consistently ranked fifth. Thus, since labour and fuel together generally accounted for something over 60 per cent of total operating expenses during 1978 (Table 23), it is not surprising to find Air Canada ranking fourth among the carriers in terms of total operating expenses per RTM, the most inclusive of airline cost measures.

Air Canada's 4.2 per cent deviation above the distance-related trend line for operating expenses per RTM compares with 7.0 per cent for fifth ranking Trans World and 1.6 per cent for third ranking CP Air. Thus, since Air Canada lies midway between CP Air and Trans World and since both these latter carriers are privately owned, there seems to be little reason to attribute Air Canada's above-average operating expenses per RTM to government ownership. This conclusion is supported by the fact that the percentage-point interval encompassing the positive deviations of these three carriers was small relative to the 10.3 percentage-point interval between CP Air and Delta's -8.7 per cent deviation, and the 20.8 percentage-point interval between CP Air's 1.6 and Northwest's -19.2 per cent deviation, with all of these carriers being privately owned. It appears that factors other than ownership account for the variations in operating expenses per RTM among the federally-regulated airlines.

If the comparison is limited to the two Canadian mainline carriers (similar to Davies' comparison of the two Australian carriers), it can be said that Air Canada was inferior to CP Air in two of the three employee measures, and was superior to it in all three of the fuel measures. Overall, Air Canada's operating expenses per RTM were somewhat poorer than CP Air's but, as indicated above, the deviation difference was just 2.6 percentage points, which is not large enough to conclude that important performance differences are associated with government ownership.

Table 40 provides additional information showing that Air Canada did not have unusually poor performance relative to privately owned airlines. To the contrary, it ranked third in RTM load factor (tied with

Table 39

Efficiency Rankings and Percentage Deviations from
Distance-Related Trend Lines for Various Performance Measures
Canadian Mainline and Selected U.S. Trunk Carriers

Efficiency Ranking	Carrier and its Percentage Deviation[a] -- Average System Values						
	Employees			Fuel			Total Op. Expenses per RTM 1975-78
	RTM per Employ. 1975-78	Op. Rev. per Emp. 1975-78	Total Payments per RTM, 1978	ATM per Litre 1975-78	RTM per Litre 1975-78	Fuel Exp. per RTM 1975-78	
1	NW 82.5	NW 55.6	NW -25.8	AC 16.9	AC 11.7	AC -9.0	NW -19.2
2	DL 14.5	TW 9.0	DL -2.0	NW 15.3	CP 5.5	NW -7.8	DL -8.7
3	TW 6.5	DL 8.5	CP 2.8	CP 0.7	NW -3.8	DL -5.3	CP 1.6
4	CP -5.0	AC -2.2	TW 16.2	DL -5.7	DL -8.7	CP -1.0	AC 4.2
5	AC -6.7	CP -5.2	AC 18.3	TW -12.9	TW -15.2	TW 5.9	TW 7.0

Sources: Tables 5, 16, 17, 22, 28 and 31

[a]Percentage deviations from distance-related trend lines calculated for 14 Canadian and U.S. federally-regulated airlines

Trans World) and second in RPM load factor (with CP Air ranking first in both measures).

Table 40

Rankings and Average System Values
for Load Factor and Input Price Measures
Canadian Mainline and Selected U.S. Trunk Carriers

Ranking	Carrier and its Average System Values			
	Load Factor		Payment	Fuel Price
	RTM 1975-78	RPM 1975-78	per Employee 1978	per Litre 1975-78[a]
1	CP 52.5%	CP 64.6%	CP $24,160	DL 8.984¢
2	DL 49.2	AC 62.0	AC 26,460	TW 9.455
3	AC 48.3	TW 59.1	DL 28,445	NW 9.502
4	TW 48.3	DL 58.1	NW 30,432	AC 10.797
5	NW 42.1	NW 48.8	TW 30,601	CP 11.193

Sources: Tables 20, 24, 25 and 29

[a]Canadian cents per litre for Air Canada and CP Air, U.S. cents per litre for the U.S. carriers. Estimated fuel purchased by Canadian carriers in foreign countries adjusted for the exchange rates between the Canadian and U.S. currencies. 1975-78 data calculated as the simple average of annual data for the four years.

The overall rankings of the prices paid for labour and fuel were clearly affected by intercountry differences (see Tables 20 and 26). Within Canada, however, Air Canada paid about 9.5 per cent higher prices for its labour and about 3.5 per cent lower prices for its fuel than did CP Air. Again, these data do not provide a consistent pattern denoting inherent inefficiency on the part of government-owned airlines, even though the load factor data for just the two Canadian airlines might be considered weak evidence in support of this contention.[2]

Australian Evidence

The inconsistency between Davies' findings for the Australian airlines and the evidence from North American airlines naturally calls for further investigation. Is there a fundamental difference between airline operations in the two continents, or is there some simpler explanation for the inconsistency? The recent publication of more detailed information for the Australian airlines demonstrates that the latter is the case.

It happens that the privately-owned firm in Australia (Ansett Transport Industries) operates through four airline subsidiaries and, apparently, when Davies wrote his article the only information available to him was for the combined operations of these subsidiaries. Of the four, only Ansett Airlines of Australia (then named Ansett ANA) was similar to the government-owned Trans-Australia Airlines (TAA) in providing interstate operations throughout the country. Indeed, due to the detailed regulation of the Rationalization Committee and the Minister for Transport, a majority of the physical attributes of these two carriers have been virtually identical over the years [Davies (a), pp. 154-61].[3] In contrast, the other three Ansett airlines are regional carriers operating smaller aircraft in largely intrastate service.[4] Therefore, a more appropriate comparison would have been between TAA and Ansett Airlines of Australia (AAA), rather than between TAA and the combined operations of all four Ansett subsidiaries as was done by Davies.

Since Davies wrote, the International Civil Aviation Organization (ICAO) and the Australian Department of Transport have begun publishing individual data for each of the four Ansett airlines.[5] Thus, it is now possible to make the more appropriate comparison between AAA and TAA. This more detailed comparison is done in Appendix M, and the interested reader is referred to that appendix for the analysis. The conclusion, however, is that excluding the small regional Ansett airlines and using more inclusive measures of output (RPM and RTM rather than number of passengers and tons of freight and mail) result in only small differences being identified between the performance of privately owned AAA and that of government-owned TAA between 1974 and 1980, with each airline being more productive than the other in some measures and/or during some years. Therefore, both the Australian evidence and the North American evidence are consistent in indicating no significant differences in the performance of federally-regulated airlines due to differences in ownership.

Summary

The finding that performance among the federally-regulated airlines is similar regardless of ownership should not be a complete surprise. Davies compared the airlines using the dichotomy of private ownership versus government ownership, but this dichotomy fails to recognize the existence of various types of private ownership and various degrees of government control. In his lectures at the University of California, Los Angeles, back in the 1960s, Professor Armen A. Alchian described a range of ownership types, each having the possibility of motivating different performance on the part of individuals and enterprises. The following is a list of some of these types of ownership:

1) Full private property with unconstrained profits.
2) Private property with profit sharing.
3) Private property with constrained profits.
4) Private property with regulated profits.
5) Nonprofit.

6) Government ownership.
7) Public/communal ownership.

This list in itself implies that the performance differences between government ownership, on the one hand, and private ownership with regulated profits, on the other, should not be as large as between government ownership and full private ownership with unconstrained profits. The performance data from both North America and Australia support this implication. Indeed, they indicate that, given a regulatory monopoly, airline performance under private ownership differs little from performance under government ownership.

It is important to emphasize that the above evidence applies primarily to relative performance under a regulatory monopoly -- it does not necessarily pertain to performance in a deregulated environment. Indeed, it could well be that the performance similarities among federally-regulated airlines, regardless of ownership, are a common response to the protected environment established by a regulatory monopoly, and that performance differences would develop with the removal of such regulation. For example, in the absence of regulation, would a government-owned airline respond in the same ways as a privately owned airline if its existence were threatened by rival carriers? Might not the government-owned airline (supported by its employees and suppliers) turn to the government for subsidies (such as direct payments and low-cost loans) or for the allocation of an increased share of government traffic, rather than make the painful adjustments that a privately owned airline would tend to make in similar circumstances? If so, the performances of government-owned and privately owned airlines would diverge.

Good evidence on the possible effects of ownership on airline operations in the absence of regulation could be forthcoming from Canada if deregulation were adopted in this country and if there were no changes in the present ownerships of the various airlines. Until this occurs, or until a similar situation develops in another political jurisdiction, it will be difficult to obtain clear evidence regarding the effects of ownership on performance under deregulation. Obviously, the evidence presented in this chapter pertains to ownership effects under a regulatory monopoly. It should be used with great caution, if at all, as a basis for policy decisions concerning ownership under deregulation.

Footnotes

1. Air Canada purchased 86.4 per cent of Nordair's issued shares (Globe and Mail, Jan. 30, 1979, p. B6). For a description of the purchase of Pacific Western by the Alberta government, see Richard G. O'Lone, "Pacific Western Seeks Area Dominance," Aviation Week and Space Technology, Aug. 8, 1977, pp. 33-35.

2. The input price differences, however, are consistent with the hypothesis that a government-owned airline is subject to paying higher prices for inputs supplied on a monopoly basis (unionized labour), but not for those supplied by an oligopolistic industry (fuel).

3. See also, Australian Department of Transport, Australian Transport, 1977-78, pp. 2-3, 40 and 172-75.

4. Between 1974 and 1979 the three Ansett regional carriers operated Fokker F-27s and F-28s, plus one or two de Havilland DHC-6s. In contrast, AAA and TAA operated mainly Boeing B-727-100/200s and DC-9-30s, plus some F-27s, Lockheed L-188s and DHC-6s [ICAO (a)].

5. ICAO began publishing information for the individual domestic Australian airlines starting with data for calendar year 1974 (telephone conversation with Mr. William Bekunda, Statistical Officer, ICAO, Montreal, Quebec, Aug. 10, 1981).

Chapter XIII

CONCLUSIONS AND POLICY IMPLICATIONS

The previous chapters show that, on the one hand, there were important similarities between the economic performance of the regulated airlines in Canada and that of the U.S. carriers regulated by the CAB during the years studied. On the other hand, the performance of the major U.S. intrastate carriers operating under state regulation differed significantly from that of the federally-regulated airlines. This implies that the new entry and resulting intensive rivalry that occurred within the duopolistic regulatory environments existing in California, Florida and Texas through 1978 did result in appreciably different economic performance than the regulatory monopolies that applied to Canadian airline operations and to U.S. interstate air transportation. Furthermore, the performance similarities among the federally-regulated airlines of the two countries mean that the CAB-regulated airlines provide a link between the Canadian carriers and the U.S. intrastate carriers that allows the economic performance of the intrastate carriers to be used to evaluate the performance of the Canadian carriers. Thus, Canadian policy makers can look to the U.S. intrastate carriers for evidence as to whether or not existing regulatory policies are achieving desired performance objectives.

Fares and Profits

One major difference between the performance of the Canadian and U.S. federally-regulated airlines and that of the U.S. intrastate carriers was in fare levels. It was shown in Chapter I that at the end of 1978 the federally-regulated domestic and transborder fares per mile of each country's carriers were much higher than those charged by the U.S. intrastate carriers. The fares per mile of the Canadian mainline and U.S. trunk carriers (determined by similar cost-related formulas) were 50 to 100 per cent higher than the peak economy fares per mile of the U.S. intrastate carriers, and 100 to 180 per cent higher than the off-peak fares per mile for evening and weekend services (Table 1). Since the speed and other capabilities of modern air transport have made economic barriers more important in transportation than physical and time barriers, it follows that large reductions in domestic Canadian fares per mile down to the levels of the U.S. intrastate carriers would greatly increase contacts between the widely separated localities of this country.

Chapter II demonstrated that there was no consistent relationship between fares and profits. Indeed, the carrier with the highest profit (measured by operating ratios) was Southwest, an intrastate carrier operating under the lowest fares per mile. At the same time, carriers such as Trans World and Eastern Provincial had low profits despite their medium and high fares per mile (Table 4). This implies that considerable differences also existed among the carriers with regard to operating costs.

Cost Differences

Table 5 showed that the federally-regulated airlines were relatively homogeneous in total system operating expenses after adjusting for the important effects of distance. A best-fit regression analysis between average system trip length as the independent variable and 1975-78 average values for total operating expenses per RTM yielded an R^2 of .866 for the 14 federally-regulated airlines. This implies that only about 13 per cent of the differences in total operating expenses among these carriers were associated with factors other than trip length. The unimportance of nationality on the 13 per cent of unexplained differences is demonstrated by the fact that the seven Canadian as well as the seven U.S. carriers were distributed fairly evenly around the distance-related trend line drawn in Figure 4; while the unimportance of private versus government ownership under regulation was indicated by the similarity of Air Canada's performance with that of CP Air and Trans World (Chapter XII).

The large, contrasting differences between the U.S. intrastate carriers' costs and those of the federally-regulated airlines can also be seen in Table 5. All four of these carriers lie below the trend line fitted to the data for the federally-regulated airlines, with negative deviations of 9.9, 31.8, 38.0 and 52.8 per cent (Air Florida, PSA, Air California and Southwest, respectively). These differences in total operating expenses are consistent with the differences in fares per mile described in Chapter I. Using the U.S. intrastate carriers' total operating expenses per RTM as the base, the federally-regulated airlines' trend line in Table 5 would be 47, 61 and 112 per cent higher than PSA, Air California and Southwest, thereby encompassing the 50 to 100 per cent by which the federally-regulated airlines' economy fares per mile exceeded the peak fares per mile of the intrastate carriers.

Sources of Cost Differences

Most of this study has been devoted to investigating the sources of the large differences in total operating expenses found to exist between the federally-regulated airlines and the U.S. intrastate carriers. The following factors were covered:

1. geographic traffic shares;
2. traffic categories;
3. labour payments and productivity;
4. fuel prices and utilization;
5. weather;
6. population;
7. cross-subsidization; and
8. economies of scale.

The findings regarding each of these factors are summarized in the following subsections.

1. Geographic traffic shares. An important characteristic of Canadian airline operations is the surprisingly small role that purely domestic traffic plays in total operations compared with the U.S. carriers who are primarily domestic operators. During 1975-78, Air Canada carried just 50.0 per cent of its total RTM domestically; CP Air, Nordair and Quebecair all carried less than 40 per cent of their total system RTM solely within Canada (Table 6). Only Eastern Provincial, Pacific Western and Transair produced more than half of their traffic domestically (77.3, 62.6 and 62.1 per cent, respectively). Taking all seven mainline and regional carriers together, purely domestic Canadian RTM accounted for just 47 per cent of their total system RTM during these years (p. 36). In comparison, Trans World and Northwest produced around 65 per cent of their system RTM domestically, while Delta and the four local service carriers all produced over 95 per cent in domestic services. Of course, the U.S. intrastate carriers produced virtually all of their traffic domestically (essentially within their respective states).

The small size of Canadian domestic traffic shares is significant in two different respects. First, in terms of policy, it means that any changes in purely domestic regulation would apply to a much smaller share of the total system operations of Canadian carriers (except Eastern Provincial and Pacific Western/Transair) than would policy changes in the United States. Second, with regard to economic factors, it means that the basic characteristics of each country's domestic economy are relatively less important to Canadian than to U.S. carriers. For example, Canadian airline executives point to Canada's small population as a major limitation on potential traffic for their carriers.[1] Since less than half of total RTM is produced domestically, however, it follows that the true traffic potential available to most Canadian carriers is much larger than that indicated by domestic population figures. The actual potential includes the major populations surrounding the airports in the United States and other countries where Canadian carriers have traffic rights for scheduled and charter services. Indeed, the 15 per cent of total RTM accounted for by transborder operations and the 38 per cent in international operations indicate the importance of this foreign traffic potential, even while recognizing that these percentages include Canadian as well as foreign originating traffic.

2. Traffic categories. There was a wide variation in the traffic mix carried by the five airline groups. On the one extreme were the U.S. intrastate carriers with domestic scheduled passenger traffic generally comprising 98 to 99 per cent of total system RTM during 1975-78, and with very little scheduled cargo or charter traffic (Table 7). Ranging down from this group were the U.S. local service carriers with 83 to 91 per cent of total system RTM derived from scheduled passenger operations, with scheduled cargo accounting for around nine per cent of total RTM and charter operations ranging from virtually nothing to 10 per cent. This group was then followed by the Canadian mainline and the U.S. trunk carrier groups with around three-quarters of their total RTM being produced in scheduled passenger service, about 20 per cent scheduled cargo, and another five per cent charter. While there were some deviations from these averages (especially for Delta

and Northwest), one is struck with how similar these large carriers were in terms of traffic distribution. Finally, on the other extreme, were the Canadian regional carriers with a significantly different emphasis. Only Eastern Provincial produced more than half (66 per cent) of its total RTM in scheduled passenger service, with the remaining carriers producing between 19.6 to 47.3 per cent of total operations in scheduled passenger service. Actually, these other four carriers were primarily charter operators, with between 47 and 72 per cent of their total RTM produced in that category, and with the majority of their charter services performed in transborder or international operations.

These percentages demonstrate that the U.S. intrastate carriers were the most highly specialized of the airline groups in terms of the types of traffic carried, i.e., scheduled passenger, while the Canadian regional carriers were the least specialized. To the extent that specialization reduces operating costs, the intrastate carriers should be helped by this specialization. However, it is important to recognize that there are other dimensions to airline specialization. For example, specialization is also a function of the numbers of aircraft types operated, airports served, classes of passenger service provided, types of fares offered and so forth.

3. Labour payments and productivity. On average, during 1978, labour accounted for around 39 per cent of total system operating expenses for the airlines studied, while petroleum products accounted for about 21 per cent of total expenses (Table 23). Together, these two major inputs generally comprised just over 60 per cent of total operating expenses, with a range of 50.5 per cent (Air Florida) to 66.8 per cent (Delta). This means that the very large differences that have been identified in total operating expenses per RTM should be reflected to an appreciable degree in these two major input categories.

After removing the effects of distance, it was found that the Canadian and U.S. federally-regulated airlines had generally similar employee productivity measured in terms of total system RTM per employee, except for Northwest which was 82.5 per cent above average in this respect (Table 16). The three largest U.S. intrastate carriers, in contrast, had RTM per employee between 66.6 and 118.0 per cent above the distance-related trend line fitted to the federally-regulated airlines, with Air Florida's RTM per employee being 17.2 per cent above the trend line. A further analysis by employee category demonstrated a positive relationship between RTM per employee for total employees and for white collar employees; that is, high productivity in the general management and other employees category was associated with high overall employee productivity (Table 19).[2]

A consistent pattern existed among the airlines during 1978 in terms of total payments to employees (including salaries and wages, benefits and personnel expenses). Table 20 shows that the U.S. trunk carriers had the highest payments at around $30,000 per year, followed by the U.S. local service carriers at $27,500, the Canadian mainline carriers at an average of $25,000 and the Canadian regional carriers with an average of just over

$22,000. The U.S. intrastate carriers had a wide range due to the very low average payment by Air Florida ($13,600), but the three largest (and oldest) of these carriers had average payments very similar to the Canadian regional carriers at around $22,000 a year. Thus, in general, the U.S. local service carriers' payments were around eight per cent lower than the trunk carriers and the intrastate carriers were over 25 per cent lower. At the same time, the Canadian regional carriers paid about 12 per cent less than the mainline carriers. On an intercountry comparison, the Canadian mainline carriers paid around 15 per cent less than the U.S. trunk carriers, and the regional carriers paid around 19 per cent less than the local service carriers, on average.[3]

Of course, input utilization and prices both affect average operating expenses. The combined effects of higher employee productivity and lower average employee payments resulted in the U.S. intrastate carriers enjoying by far the lowest employee expenses per RTM. As shown in Table 22, during 1978 these four carriers had employee expenses per RTM ranging from -38.9 per cent (PSA) to -65.1 per cent (Southwest) below the best-fit trend line, which was obtained by regressing employee expenses per RTM against average system trip length for the federally-regulated airlines (yielding a statistically significant R^2 of .865). The Canadian regional carriers' generally lower average employee payments (except for Nordair) resulted in their also having below average employee expenses per RTM, ranging from -4.2 per cent (Nordair) to -20.4 per cent (Quebecair) below the trend line, but they were not as low as the intrastate carriers in this regard.

Appreciably different performance characterized the U.S. local service carriers whose high average employee payments and roughly normal RTM per employee placed them above the trend line (from 1.6 per cent for Southern to 15.1 per cent for Frontier). Finally, the combination of high employee payments and varying RTM per employee resulted in the mainline and trunk carriers having mixed performances in terms of employee expenses per RTM. Air Canada, CP Air and Trans World were above the distance-related trend line by 2.8 to 18.3 per cent, while Delta and Northwest were 2.0 and 25.8 per cent below the line. Clearly, Northwest's outstanding performance in RTM per employee more than counterbalanced its high average employee payments, while Delta's modest advantage in RTM per employee was supported by its average employee payments being somewhat lower than those of Trans World and Northwest. Trans World's slightly above average RTM per employee could not offset its paying the highest average rates to its employees, while the lower payments of Air Canada and CP Air did not offset their below average RTM per employee.

Thus, while there was variation among the federally-regulated airlines (related mainly to differences in average employee payments), they did tend to cluster around the distance-related trend line. In contrast, the U.S. intrastate carriers achieved substantially lower employee expenses per RTM, due both to lower average employee payments (especially for Air Florida) and to very high employee productivity. The fact that the intrastate carriers were 38.9 to 65.1 per cent below the norm in an expense cate-

gory that accounts for around 39 per cent of total airline operating expenses goes a fair way in explaining why they could be profitable while charging regular economy fares per mile as much as 50 per cent lower than the federally-regulated airlines.

4. Fuel prices and utilization. The U.S. intrastate carriers also achieved low fuel expenses per RTM, thereby having superior performance in an additional 21 per cent or so of total operating expenses (Table 31 and footnote 8, Chapter IX). This time, however, their favourable performance was not helped by paying lower prices for the input. Actually, the intrastate carriers paid the highest average prices among the U.S. carriers, but the differences were small -- their 8.2 to 10.7 cents per litre prices were only about two per cent higher than the trunk carriers' system prices during 1975-78, four per cent higher than the trunks' domestic prices, and about one per cent higher than the local service carriers' prices (Table 24).

There was no similarity in fuel prices between the two groups of Canadian carriers. Table 24 shows that during 1975-78, the regional carriers' system fuel prices averaged from 6.8 to 10.0 per cent above those of the mainline carriers, with considerable variation within each group. The differences were even greater for estimated domestic fuel prices -- perhaps due to higher prices paid by the regional carriers for that portion of their domestic fuel purchased at remote points in the far north. During these years the regional carriers paid between 7.7 and 15.2 per cent more for their domestic fuel than the 8.7 to 13.0 cents per litre paid by the mainline carriers.

Still larger differences existed in the fuel prices paid by the Canadian carriers compared with the U.S. carriers. After making exchange rate adjustments for fuel purchased outside Canada, Canadian mainline carriers generally paid between 15 and 20 per cent more per litre for fuel systemwide than comparable U.S. trunk carriers during 1975-78, and the Canadian regional carriers paid from 15.8 to 43.4 per cent higher prices than the U.S. local service carriers, with an average of 27.4 per cent (Table 26).

The major source of the intercountry differences was the higher sales taxes and fuel-related airport fees assessed in Canada. Deleting the taxes and airport fees from the domestic fuel prices of both countries resulted in net prices paid by the Canadian mainline carriers being similar to those paid by the U.S. intrastate carriers -- seldom greater than five per cent higher and sometimes even lower than the U.S. trunk carriers' average prices (Table 27). Among the regional carriers, Transair's net prices were slightly below those of the U.S. local service carriers, and the other regional carriers paid between 1.6 and 24.2 per cent more than the comparable U.S. carriers. Obviously, one way for Canadian airline costs to be reduced would be for Canadian fuel taxes and airport fees to be lowered to U.S. levels -- an adjustment within the discretion of Canadian federal and provincial policy makers.

Among the U.S. carriers, similar fuel prices mean that differences in fuel expenses per RTM were mainly due to differences in fuel utilization. Figure 17 shows the similarities in domestic fuel prices among U.S. carriers. It also shows that all the U.S. trunk and local service carriers analyzed in this study (except Frontier) produced below average RTM per litre of fuel (after adjustment for distance), while the U.S. intrastate carriers (except Air Florida) produced higher than average RTM per litre. Therefore, it is not surprising to find Frontier and the three largest U.S. intrastate carriers having low average fuel expenses per RTM (relative to the distance-related trend line) while the U.S. trunk and the remaining local service carriers were clustered above and below the trend line (Figure 16, plus footnote 8, Chapter IX).

In contrast, Figure 17 also shows that, except for Eastern Provincial and Transair, the Canadian carriers produced above average RTM per litre of fuel, thereby partially or completely counterbalancing their relatively high fuel prices (including taxes and airport fees). Thus, they too fell both above and below the fuel expense trend line, with the high prices paid by the regional carriers putting three of them above the trend line and with the other two regionals plus Air Canada and CP Air being somewhat below the line.

Overall, Figure 16 shows no consistent intercountry differences in fuel expenses per RTM among the federally-regulated airlines. The lower fuel prices of the U.S. carriers tended to be counterbalanced by lower fuel utilization, and vice versa for the Canadian carriers. At the same time, however, the three largest U.S. intrastate carriers (and Frontier) had expenses per RTM 11.5 per cent to 21.4 per cent below the trend line (Table 31, plus footnote 8, Chapter IX). While not as outstanding as their employee expenses, this favourable performance also contributed to the intrastate carriers' ability to be profitable while charging low fares per mile.

5. Weather. Neither direct nor indirect evidence supports the argument that adverse weather is an important source of higher operating costs for Canadian carriers, or that good weather plays an appreciable role in reducing the operating costs of the U.S. intrastate carriers. There is little question that adverse weather increases airline costs, but the 18 carriers studied all appeared to suffer from its effects.

No statistically significant relationship was found to exist among the federally-regulated airlines between actual and distance-adjusted operating expenses per RTM, and distance-adjusted RTM per employee, on the one hand, and average annual snowfall, average minimum winter temperatures, and average maximum summer temperatures, on the other hand (pp. 135-38). A small, but statistically significant, relationship was found between the distance-adjusted variables and the percentage of below Category I minimums experienced by the carriers. However, there was a fair amount of overlap among the Canadian and U.S. carriers with regard to Category I minimums, and the U.S. intrastate carriers were about average in this factor. Therefore, intercountry differences are not large, and the intrastate carriers are not

appreciably benefitted by this weather factor relative to the federally-regulated airlines.

Indirect evidence regarding the lack of effects of adverse weather on average operating expenses was obtained by comparing the relative percentages of "outdoor" versus "indoor" employees for the various airlines. If the more severe Canadian weather increases operating expenses, one manifestation of this should be a requirement for larger numbers of employees to maintain operations, with most of these extra employees being utilized in jobs having greater exposure to weather. Specifically, one would expect to find the Canadian airlines employing relatively more pilots and copilots, and other flight personnel (cabin attendants), than the U.S. carriers. Conversely, they should also employ relatively fewer employees who work indoors in positions not directly affected by weather, such as general management, accounting, purchasing, research and sales personnel. It happens, however, that just the opposite employee distribution occurred among the larger carriers during 1975-78. The Canadian mainline carriers had appreciably smaller percentages of total personnel in the pilot and other flight personnel categories than the U.S. trunk and intrastate carriers. At the same time, the Canadian carriers had larger percentages in the general management and other employees categories (Table 34). Furthermore, there was little difference between the Canadian regional and the U.S. local service carriers in their distributions among these categories. These inconsistencies between the actual and expected distributions provide good evidence that adverse weather does not have appreciably different effects on employment by Canadian and U.S. carriers and, therefore, on operating expenses per RTM.

6. Population. Population is a proxy for traffic demand, and the argument is that carriers having access to larger populations and greater traffic will be able to achieve lower operating expenses per RTM. The analysis can be limited to the populations of Canada and the United States since the international operations of all these carriers serve the largest population centres of the various countries and, indeed, the Canadian mainline and U.S. trunk carriers serve a number of the same foreign points.

The data on pp. 145-150 show that Canada's 1978 population was only 10.7 per cent as large as the U.S., while its total domestic and transborder O&D passenger volume was 10.9 per cent of the U.S. Thus, Canada generated slightly more O&D passengers per capita than the United States (1,726 per 1,000 population versus 1,705). While having about one-ninth the number of O&D passengers, Canadian mainline and regional carriers served one-quarter the number of points served by all the U.S. trunk, local service and intrastate carriers during 1978 (104 versus 400). This reflected the coverage of points in the more remote areas of Canada by the regional carriers, while small points in the United States were served primarily by unregulated commuter carriers. Obviously, total population and average population per airport were much lower in Canada than in the United States. However, these intercountry differences do not represent the differences in total North American population that were available to the carriers of each country during the 1970s since most Canadian and U.S. carriers served airports in

both countries and, therefore, had access to populations located on both sides of the border.

The following three population variables were investigated in terms of their possible effects on operating costs:

a) The total population pool available to each carrier in Canada and the United States, determined by summing the aggregate populations in areas surrounding the airports served by each carrier (Table 36).

b) The average population per airport for each carrier, obtained by dividing its population pool by the number of airports it served. This indicates the population density of a carrier's system (Table 37).

c) The average population per airport carrier, that is, each carrier's total population pool divided by the number of large airlines operating at each of the airports served by that carrier. This indicates the population density adjusted for the degree of competition/rivalry facing the carrier from other airlines (Table 38).

These three independent variables were regressed against (1) total operating expenses per RTM, (2) distance-adjusted total operating expenses per RTM, and (3) distance-adjusted total RTM per employee. The R^2 for best-fit regressions between these variables ranged from .169 down to under .001 and were not statistically significant (footnotes 8, 10 and 12, Chapter XI).

In addition to the lack of significant relationships indicated by statistical inference, individual comparisons between the federally-regulated airlines and the U.S. intrastate carriers also challenge the assertion that population has an important effect on operating costs. For example, since the average number of carriers serving U.S. airports were generally two to three times greater than the number serving Canadian airports (Table 38), it is not surprising to find that the 1970/71 populations per airport carrier were almost the same among the Canadian mainline and U.S. trunk carriers, ranging from 190,000 to 217,000 per airport carrier. The population averages for the U.S. intrastate carriers were all lower than those of the larger carriers -- 75,000 for Air Florida, 133,000 for Air California and Southwest, and 174,000 for PSA. If population per airport carrier were a major determinant of airline costs, one would expect the mainline and trunk carriers to have consistently similar RTM per employee and total operating expenses per RTM, with intrastate carriers having relatively poor performance in these factors. However, after adjusting for distance, Figure 4 shows that Northwest had appreciably lower total operating expenses per RTM than its fellow carriers, and Figure 9 shows its very much greater RTM per employee. At the same time, the intrastate carriers' superior performance was just the opposite of that predicted.

Overall, the evidence fails to support the assertion that there is an overall inverse relationship between population and airline costs in general. Nor is there any consistent indication that the costs of Canadian airlines differ from those of comparable U.S. carriers because of population differences. To the contrary, the evidence strongly suggests that population is not an important determinant of airline costs.

7. Cross-subsidization. One argument regarding the effects of regulation is that it promotes cross-subsidization (internal subsidy) whereby service is provided on loss routes in return for protection from competition on profitable routes. The airlines' joint production of outputs (using an aircraft over a diversity of routes, for example) and the possibility that traffic originating/terminating on loss routes also utilizes and provides revenues on profitable routes, makes it difficult to isolate cases of cross-subsidization. However, some fragmentary evidence is available that implies Canadian carriers cross-subsidize their international operations at the expense of their domestic operations.

The evidence is of two sorts, and it has to do with implications about what would be observed if cross-subsidization were indeed practiced. First, under cross-subsidization, one would expect that operations over routes being subsidized would have higher RTM shares relative to revenue shares than would exist over routes providing the subsidy. This proved to be the case among the Canadian carriers in that they obtained appreciably more revenues than RTM from domestic operations and relatively fewer revenues than RTM from international operations (Tables 6 and 8). This difference is highlighted by the fact that the U.S. trunk carriers' revenues were distributed more in accordance with their RTM shares between domestic/transborder and international operations.

The second piece of evidence concerns passenger yields. A comparison of actual domestic and international yields with yields calculated from the cost-related domestic fare formulas of the Canadian mainline and U.S. trunk carriers indicates that domestic yields were higher than the mainline carriers' international yields in 1978, while just the opposite was true for the U.S. trunk carriers (Table 10). This is also consistent with what would have existed if international operations were being cross-subsidized by the domestic operations of the Canadian carriers.

Better evidence on the existence of cross-subsidization between the major operating areas could be obtained by comparing revenue shares with shares of operating costs. Since, however, the CTC(A) and the airlines have refused to allow cost information by operating area to be presented in this study, it has not been possible to provide that evidence. The importance of analyzing such information is apparent if, indeed, one aim of public policy is to cross-subsidize low-density domestic rather than international routes. The above limited evidence indicates that just the opposite situation may be occurring. Furthermore, if some domestic routes are being cross-subsidized, any cross-subsidization of international routes places an even greater burden on the remaining profitable domestic routes (and the passengers and shippers utilizing those major routes).

8. Economies of scale. This study also provides evidence regarding the degree and importance of economies of scale among Canadian and U.S. airlines. The relative positions of the federally-regulated airlines on Figure 4 are quite inconsistent with the belief that larger airlines have lower operating expenses per RTM. If that were true, Nordair and CP Air would have higher operating expenses per RTM than Air Canada; yet the opposite is the case, both absolutely and relative to the distance-related trend lines. The same is true of the relationships between large Trans World and smaller Northwest and Delta. Both the smaller airlines lie below the trend line in Figure 4, while Trans World lies above it. Furthermore, Northwest has even lower absolute operating expenses per RTM than either Trans World or Delta, both of which are larger than Northwest.

Economies of scale are also inconsistent with the fact that the three largest (but still small) U.S. intrastate carriers had operating expenses per RTM equal or superior to very much larger federally-regulated airlines (irrespective of average trip length). This would not have occurred if firm size were an important factor in decreasing average costs.[4]

Ever since Koontz's original study back in 1951, researchers have investigated the possibility of economies of scale existing in the airline industry. Without exception, significant scale economies have not been found (White, 1979). The evidence from this study is consistent with that long line of empirical research and, together, these findings mean that very small airlines can achieve whatever scale economies exist in the airline industry. Thus, it is not necessary to promote the development of large airlines to reduce operating expenses. Indeed, the performance of the U.S. intrastate carriers indicates that such a policy may be counterproductive.

Other Cost Factors

Three other major sources of airline costs have not been analyzed in this study: aircraft costs, charges for the use of airport facilities and the cost of capital. The first two are included in total operating expenses and comprise most of the roughly 40 per cent of those expenses not accounted for by employee and fuel expenses. The third is classified as a non-operating expense, but it is largely influenced by expenditures on aircraft since aircraft commonly account for around 80 per cent of an airline's total assets [CAB (p), Nov. 1979, pp. 77-78].

There is little reason to expect that the prices paid for new aircraft by the various carriers should differ appreciably. Of course, the Canadian dollar prices should be adjusted by the exchange rate in effect at the time of purchase since essentially all the aircraft operated by the Canadian carriers during 1975-78 were purchased in the United States. However, some adjustments may be required to reflect the purchase or lease of second-hand aircraft rather than new aircraft (a factor that would be important for Air Florida). But any price differences are probably small in relation to differences in aircraft utilization.

A prior study of aircraft utilization found that, as of 1975, the U.S. intrastate carriers utilized their aircraft appreciably more than the federally-regulated airlines by installing 10 to 25 per cent more seats in identical aircraft (due, in part, to operating only all-economy configurations).[5] In addition, Table 29 (plus p. 118) shows that the scheduled passenger load factors of the three largest U.S. intrastate carriers averaged from 62.2 to 71.8 per cent during 1975-78, compared with 61.1 to 63.2 per cent for Air Canada and CP Air, and 47.7 to 57.8 per cent for the three U.S. trunk carriers. Thus, not only did the intrastate carriers install more seats in their aircraft, but they generally filled a larger proportion of those seats. Overall, these two factors yielded increased aircraft utilization by the U.S. intrastate carriers that was 20 to 25 per cent greater than the Canadian mainline carriers, and 30 to 35 per cent greater than the U.S. trunk carriers. This indicates that the U.S. intrastate carriers probably also had lower aircraft operating expenses per RTM than the federally-regulated airlines.

Any differences in prices paid for airport facilities within each country should also be small since it is common for all carriers at each airport to be charged the same prices for comparable facilities and services. Again, therefore, any differences in airport expenses per RTM would probably be due to the relative sizes of facilities and the degree of utilization. However, fragmentary evidence indicates that Canadian airport prices may be higher than those charged by most U.S. airports. The generally higher fuel-related airport fees are an example of this. Therefore, there may be intercountry differences in this matter, but a careful analysis of airport costs has yet to be undertaken.

Finally, with regard to the cost of capital, it seems likely that the smaller and younger U.S. intrastate carriers paid higher prices for capital during 1975-78 than the established federally-regulated airlines (especially Air Canada as a crown corporation and CP Air as a subsidiary of Canadian Pacific Ltd.). Therefore, in order to achieve roughly comparable capital costs per RTM it would have been necessary for them to continue their pattern of above average utilization of assets. Their high aircraft utilization is consistent with this requirement, but no conclusions can be drawn since this aspect of airline costs has yet to be analyzed.

Reasons for Cost Differences

This study has provided considerable evidence that the federally-regulated airlines of Canada and the United States have experienced roughly comparable total operating expenses per RTM (after adjusting for distance), with the relatively small differences that did exist among them not being attributable to nationality or to whether an airline was privately owned or government owned. Furthermore, it has demonstrated that the operating expenses of these airlines have been much higher than those of the three largest U.S. intrastate carriers. The reasons why the U.S. intrastate carriers have been such low-cost carriers have been sought primarily in the relative prices paid for inputs (labour and fuel) and their utilization.

The intrastate carriers did pay fairly low salaries to their employees, but their total employee payments were comparable to those paid by the Canadian regional carriers. At the same time, the U.S. intrastate carriers did not enjoy lower fuel prices. Therefore, while lower employee payments were helpful, lower input prices in general were not the major cause of their lower operating expenses. Instead, the high utilization of inputs appears to be the most important factor. It existed among labour, fuel and probably aircraft, and the differences were large relative to the federally-regulated airlines. Thus, the question becomes, How did the U.S. intrastate carriers manage to achieve high input utilization?

The arguments that the outstanding performance of the U.S. intrastate carriers was due to favourable weather conditions and to serving large population/traffic centres were found to be unsupported by the evidence. Also, it was shown that economies of scale are not important in the airline industry, and it appears that any possible diseconomies of scale would not account for the much higher costs of the federally-regulated airlines. Therefore, an answer really has not been provided to the question of how the U.S. intrastate carriers have been able to achieve high input utilization.

Throughout this study, reference has been made to the greater specialization practiced by the U.S. intrastate carriers as a possible reason for their higher productivity and lower operating costs. Individual U.S. intrastate carriers (especially Air California and Southwest) seldom operated more than two aircraft types at one time, and generally operated only one type (Table 30). They served relatively few cities and routes, and those served had traffic densities and distances compatible with their aircraft type. They never offered more than one class of service (always economy class), and their fare structure was generally uncomplicated with few promotional fares (other than off-peak fares which applied to every seat on every specified flight). The implications of this uncomplicated type of operation apply to such things as employee training, aircraft maneuvering, maintenance and engineering, passenger ticketing and handling, schedule planning, tariffs and so on. It is significant that none of the evidence presented in this study has been inconsistent with the hypothesis that specialization does result in substantially lower operating costs.

In the process of gathering data for this study, one piece of evidence surfaced that illustrates the effects of complicated operations on employee utilization and, therefore, on costs. In late 1977, Public Law No. 95-163 gave the U.S. intrastate carriers (except Southwest) permission to interline their passengers with the CAB-regulated airlines. In response, PSA implemented an interline reservations system by obtaining access to American Airlines' SABRE system and assigning specially trained personnel to handle only interline transactions, while all other agents continued to handle only PSA online reservations. PSA's records show the interesting fact that by mid-1979 (a year after interlining had been implemented), the monthly average transaction time on an interline telephone call was 345 seconds (almost six minutes), compared with just 135 seconds for a telephone call making a PSA online reservation.[6] Furthermore, PSA's Director of

Reservations, Mr. Opp, said an appreciable part of the added 210 seconds (3½ minutes) per call was spent answering questions about the availability of promotional or other low fares, or explaining that economy seats were sold out but that first-class was still available, and asking whether the caller would like to be booked first-class and wait-listed on economy (ibid). In other words, much of the extra time per call was spent handling the complications that have been associated mainly with federally-regulated airline operations.

At first glance, a difference of 210 seconds in average reservation time would not seem to have a major impact on overall operating expenses. However, Mr. Opp pointed out that during the first half of 1979 PSA reservations handled an average of 864,000 calls a month for its own services, and an additional 27,000 interline calls. Therefore, a reduction of just one second per phone call would yield a saving of 247.5 hours of agent time per month, or about 1½ agents, assuming a 7.5-hour work day. Of course, more agents also mean more space and equipment. During 1975, while handling an average of 685,000 monthly phone calls at an average transaction time of 110 seconds, PSA had 16,500 square feet of reservation office space, while in 1979, with about 30 per cent more phone calls, they had 35,000 square feet of office space, a 112 per cent increase. Also, they had more incoming phone lines, and so on.[7]

Obviously, simplifying operations of all airlines to the level of the intrastate carriers would not result in a reduction of the number of reservations agents by 60 per cent (going from 345 to 135 seconds per phone call), but it would certainly increase RTM per reservation agent by an appreciable amount (perhaps as much as 100 per cent). And it should not be forgotten that PSA is a relatively small airline. The large federally-regulated airlines handle many more calls than PSA so that a one-second reduction in time per call would save many more than 1½ agents per airline.

For those who believe PSA may be unusually efficient in handling its own reservation calls, consistent information is available from two other intrastate carriers. Air Florida reported an average talk time of 125.4 seconds on calls received on its Florida WATS line during mid-1979, compared with 189 seconds on calls received on its U.S. WATS line.[8] Similarly, Southwest (which does not interline with other carriers) reported an average talk time of 122.63 seconds in July 1979, an appreciable increase from the 87.58 seconds experienced during 1978.[9] The increase in talk time was attributed to the following factors:

1. relatively more questions from novice travelers who tend to travel in the summer;

2. serving more cities, especially New Orleans where a somewhat different fare structure was in effect;

3. an overburdened computer (due in part to item 2);

4. the operation of a single B-727-200 in addition to the basic fleet of B-737-200s. Experienced travelers inquired about, and tried to avoid flying on, the B-727-200 because its larger capacity required ground times in excess of Southwest's scheduled 10 minutes, thereby resulting in the B-727-200 falling behind schedule as the day progressed. (Note: Southwest terminated B-727-200 service in early 1980);

5. more schedule changes than in 1978 so that agents couldn't have the schedule memorized as much of the time; and

6. a fare change on July 13, 1979, resulting in increased time to quote new fares (ibid).

The above is simply one illustration of how complexity can influence airline operations and costs. It points out the value of Southwest's motto: "KISS -- Keep it Sweet and Simple."

Policy Implications

1. Entry. An important implication flows from the findings that weather and population differences do not significantly affect airline operating costs, and that there are essentially no economies of scale due to airline size. This implication is that a substantial number of new airlines would enter the Canadian industry in the absence of regulation, resulting in a significant increase in the total number of viable Canadian carriers operating scheduled service with large aircraft in domestic and transborder operations.

This implication is based on the following reasoning. First, the lack of scale economies in airline operations means that small carriers can enter and compete with larger, established carriers on at least an equal footing with regard to operating costs. Second, the evidence that weather and population do not appreciably affect the operating costs of North American airlines operating large aircraft means that these factors would not result in new Canadian carriers having to incur higher costs than new U.S. carriers because of adverse Canadian weather or smaller populations. Finally, the fact that Canadian and U.S. carriers differ much less in terms of population per airport carrier than in terms of basic population pools means that, given some access to transborder traffic, the population base exists to support additional Canadian carriers, just as the population base in the United States has supported additional carriers where regulatory entry barriers have been low or nonexistent. An increase in the number of carriers occurred within California, Florida and Texas in the absence of regulatory barriers to entry, and it is currently happening throughout the United States with the implementation of deregulation. The above findings give every reason to believe that it would also occur in Canada.

It may be proposed that Canada is different from the United States with regard to the entrance of new airlines because Air Canada's large share

of the current Canadian market (see pp. 33-34) will allow it to dominate Canadian air transportation in the absence of regulation, thereby effectively preventing new entry. One response to this suggestion is to point out that Air Canada's present large size relative to other Canadian carriers was achieved under regulation. But, more important, there is evidence from the U.S. intrastate experience to indicate that large and supposedly dominant carriers are unable to prevent the entry of new airlines.

In the late 1940s, United Air Lines was the dominant carrier within California, with limited rivalry provided by Western Air Lines. Yet the intrastate carriers (especially PSA and California Central) were able to enter and survive the competition of these large CAB-regulated airlines despite the strong support enjoyed by United and Western from their interstate operations -- support that was foreclosed to the intrastate carriers by CAB regulation.

The major reason for the success of the intrastate carriers in California appears to have been their very low operating costs which allowed them to survive while charging fares that were more than 50 per cent below the CAB-authorized fares ($9.99 vs. $21.05 between Los Angeles and San Francisco). Not only did those low fares attract passengers to the intrastate carriers, but they resulted in large increases in total traffic as United and Western matched them over a year later. As a result, by 1952 total traffic in the three major California city pairs was 141 per cent above the 1948 level, the CAB-regulated airlines carried 82 per cent <u>more</u> passengers than they had four years earlier and the successful intrastate carriers were able to survive on their 26 per cent share of total revenue passenger-miles [Jordan (b), pp. 17-24, 78, 276-79, 284 and 305-18].

Southwest faced similar dominance by Braniff Airways within Texas in the early 1970s (with additional rivalry from Texas International), while Air Florida had the same problem with Eastern Airlines within Florida in the mid-1970s (with National also providing rivalry in some city pairs). Each of these cases is similar to that currently existing within Canada, except that United and Eastern have always been much larger than Air Canada (in terms of RTM), while Braniff was about 70 per cent as large during 1978.[10] The fundamental advantage enjoyed by the intrastate carriers has been their low operating costs -- a potent advantage indeed.

2. <u>Predictions regarding deregulation in Canada</u>. As was pointed out in the Introduction, the U.S. intrastate carriers' performance provides the best available evidence regarding the long-term effects of implementing airline deregulation which results in an environment comparable to that experienced by the intrastate carriers through 1978. This environment would have the following attributes:

a. entry into the industry by all new carriers allowed provided only that they comply with federal safety regulations. All airlines (new and existing) permitted to operate over the routes of their choice without restriction as to type of aircraft utilized;

b. extensive price competition allowed with all fare and rate decreases implemented without interference. At most, regulation would be limited to approving fare and rate increases. However, a balanced termination of restrictions on increases as well as decreases would encourage more price experimentation; and

c. no restrictions on the quality and quantity of service operated. Thus, any desired schedule pattern and frequency, seat configuration, reservation service, ticketing requirement, baggage allowance and so forth, could be adopted by individual carriers.

If the Canadian regulatory environment were changed by the adoption of these policies, the performance of the U.S. intrastate carriers provides the basis for predicting the following long-term developments in Canadian airline performance:

a. prices would decrease by as much as 50 per cent from regulated levels;

b. the fare structure would become less complicated;

c. operating costs of successful airlines would be substantially reduced;

d. profits of successful airlines would be comparable to the historical levels of present-day carriers;

e. the number of airlines would increase, with each being more specialized than existing regulated airlines;

f. service quality would decline somewhat, with the elimination of first-class service, increases in seat densities and increases in average load factors;

g. charter service would decline substantially and would be largely limited to single-entity services; and

h. there would be no change in safety, with existing safety regulation continuing under Transport Canada.

These predictions pertain to airline performance after deregulation has been in effect for a number of years (perhaps a decade or more). Obviously, many intervening steps would be required to proceed from the performance of airlines operating under the current Canadian regulatory environment to the performance achieved by the U.S. intrastate carriers in their appreciably different environment. The U.S. interstate carriers are currently progressing through this intervening period, with the phasing out of CAB regulation to be completed by January 1, 1985. Since the performances of federally-regulated airlines in Canada and the United States were basically the same under comparable economic regulation, there is good reason to

believe that the Canadian carriers' transition to deregulation would track that of the U.S. carriers. Therefore, it could be proposed that Canada wait and observe the transition effects of U.S. deregulation before deciding to adopt similar policies. Unfortunately, the "wait and see" alternative is far from risk free.

The major risk of postponing deregulation is that there is considerable rivalry between Canadian and U.S. carriers, and operating in a deregulated environment will make successful U.S. carriers more effective competitors. Not only will they have lowered their operating costs appreciably, but they will have gained experience in responding to the marketing and operating problems associated with deregulation (in contrast to the problems associated with regulation). The roughly 15 per cent of Canadian carriers' RTM moving over transborder routes will be directly exposed to the competition of the changed U.S. carriers. In addition, extensions of low-fare international service by U.S. (and other foreign) carriers will impinge on the 38 per cent or so of the Canadian carriers' total RTM moving internationally. This will become more prevalent with the expansion of international service at nearby U.S. cities such as Boston, Pittsburgh, Detroit, Minneapolis and Seattle. Furthermore, the widespread development of low-fare domestic service in the United States will be observed by Canadian travelers who will question why similar widely-available domestic fares and service are not offered by Canadian carriers. Responding to the resulting pressure for lower domestic fares could weaken the Canadian carriers with their higher regulatory-related operating costs. In short, postponing deregulation in Canada could mean that when it is finally implemented, weakened Canadian carriers would have to undergo the necessary adjustments more rapidly and painfully than their experienced U.S. counterparts.

The adoption of deregulation in both Canada and the United States would allow a somewhat modified form of deregulation to be implemented in the important transborder operations between the two countries. Such deregulation would be characterized by open entry and unregulated fares for transborder service, but without extending domestic cabotage rights to the carriers of the other country. Thus, any Canadian carrier would be able to serve any U.S. point, but could not carry traffic between two or more U.S. cities, with the same provision applying to U.S. carriers serving Canada. In such a situation, it is predicted that Canadian carriers would tend to dominate long-haul service to cities on the eastern, southern and western periphery of the United States (building on backup traffic from the Canadian domestic market), while U.S. carriers would tend to be more successful in relatively short-haul service to and from points located in the central and northern parts of the United States (building on backup traffic from interior U.S. points).

General Considerations

The low-fare and low-cost performance of the U.S. intrastate carriers has demonstrated that deregulation is a viable policy alternative, and it proved instrumental in influencing U.S. policy makers to deregulate the

U.S. interstate airlines (U.S. Senate, 1975, pp. 3-5 and 40-58). Deregulation has not brought chaos to the U.S. industry. To date, the existing U.S. airlines have been slowly adjusting to deregulation while coping with other major changes that have been quite unrelated to deregulation (such as uniquely large increases in fuel prices, a recession and the DC-10 grounding). New airlines have begun to enter the industry and existing airlines have expanded into new routes, resulting in substantial increases in competition in many city pairs.[11]

Deregulation is not risk free, but neither is continued regulation. Deregulation does, however, have one fundamental advantage over continued regulation. Low operating costs have characterized the successful intrastate carriers operating within California, Florida and Texas, while high operating costs have been associated with federal regulation. The long-term economic strength of low-cost carriers is much greater than that of high-cost carriers. Therefore, deregulation policies designed to foster low-cost operations will more likely be successful than alternative policies. Furthermore, low-cost carriers are able to offer low fares, thereby allowing the inherent technological advantages of air transportation to effectively shrink the distances between the dispersed regions of a large country such as Canada.

Footnotes

1. "Ian A. Gray, president and chief executive officer of Canada's second largest airline, said here recently that deregulation in his country has resulted in too many airlines 'all charging after 25 million people -- and not all of them fly.'" Aviation Week and Space Technology, Dec. 15, 1980, p. 41.

2. Using operating revenues (rather than RTM per employee) as the measure of output results in relatively homogeneous employee productivity among all the carriers (Table 17). This measure is biased against the intrastate carriers since their low fares per mile require more RTM to yield a given amount of revenues. However, it does include revenues earned by carriers (particularly the mainline and trunk carriers) from supplying maintenance, ground handling and reservation services to other carriers. The intrastate carriers were still above average in this measure, but only by amounts similar to those achieved by several of the federally-regulated airlines.

3. The Canadian carriers' payments are measured in Canadian dollars, while the U.S. carriers' payments are in U.S. dollars. Applying a partial exchange rate adjustment of about seven per cent to these 1978 data would result in the Canadian mainline carriers being about 21 per cent below the U.S. trunk carriers in average employee payments, and the Canadian regional carriers being about 25 per cent below the U.S. local service carriers. However, for reasons outlined in Appendix B, and at several other points in this study, significant exchange rate adjustments do not appear to be warranted.

4. Additional information regarding the absence of economies of scale is given on pp. 60 and 70.

5. Jordan (a), pp. 55-58. The recent trend among the federally-regulated airlines in increasing seat densities has probably resulted in reducing the U.S. intrastate carriers' advantage in this factor.

6. Letter from Mr. J.G. Opp, Director of Reservations, PSA, July 13, 1979 and a conversation with Mr. Opp, July 11, 1979.

7. Ibid. The increase in floor space was due in part to moving to new quarters.

8. Letter from Mr. M. Creasser, Manager -- Telephone Sales, Air Florida, Oct. 9, 1979.

9. Conversation with Mr. Lowell McCallister, Manager -- Procedures & Publications, Southwest Airlines, Aug. 17, 1979 and a telephone conversation with Cathy (last name not known), Reservations Manager, Southwest Airlines, Aug. 17, 1979.

10. Calculated from data in Table E.I and CAB (c), Dec. 1978.

11. It has been said that deregulation has also resulted in the replacement of trunk and local service carriers at smaller cities by commuter carriers. These replacements are, however, largely the continuation of a long-established trend primarily reflecting changes in the sizes of aircraft operated by the various airline groups. Between 1946 and late 1978, the CAB authorized individual trunk carriers to suspend service at 345 points, while individual local service carriers were allowed to suspend service at 365 points [CAB, Bureau of Consumer Protection, North Central-Southern Merger Case, Direct Exhibits, Docket 33136 (Oct. 13, 1978), Exhibits Nos. BCP-DE-5 and 6 (corrected)].

Appendix A

SUMMARY OF PASSENGER FARE CHANGES, 1977-78

Table A.1

Summary of the Across-the-Board Domestic Passenger Fare Changes Authorized by the CTC(A) and the CAB for the Canadian Mainline and U.S. Trunk Carriers, 1977-78

Canadian Mainline		U.S. Trunk	
As of 1/1/77	Economy fare formula of $26.00 startup charge + 7.47¢/mile for first 1,500 miles + 6.91¢/mile over 1,500 miles. First class (FC) = 150% of economy.	As of 1/1/77	Coach fare formula of $15.74 terminal charge + 8.60¢/mile for first 500 miles + 6.56¢/mile for next 1,000 miles + 6.31¢/mile over 1,500 miles. First class (FC) = 143-52% of coach.
		1/15/77	2.0% increase in coach formula: $16.05 + 8.77¢ + 6.69¢ + 6.43¢ (same mileages as 1/1/77). FC= 143-52% of coach.
3/1/77	7% increase in economy formula: $27.82 + 8.00¢ + 7.39¢ (same mileages as 1/1/77). FC increased to 160% of economy.	4/1/77	FC increased to 150-63% of coach.
		7/18/77	0.7% increase in coach formula: $16.16 + 8.84¢ + 6.74¢ + 6.48¢ (same mileages as 1/1/77). FC = 150-63% of coach.
		8/15/77	0.8% increase in coach formula: $16.29 + 8.91¢ + 6.79¢ + 6.53¢ (same mileages as 1/1/77). FC = 150-63% of coach.
		9/1/77	0.5% increase in coach formula: $16.38 + 8.95¢ + 6.83¢ + 6.56¢ (same mileages as 1/1/77). FC = 150-63% of coach.
		10/1/77	2.0% increase in coach formula: $16.70 + 9.13¢ + 6.97¢ + 6.69¢ (same mileages as 1/1/77). FC = 150-63% of coach.
		11/4/77	1.0% increase in coach formula: $16.87 + 9.22¢ + 7.03¢ + 6.76¢ (same mileages as 1/1/77). FC = 150-63% of coach.

Table A.1 (continued)

Canadian Mainline		U.S. Trunk	
4/1/78	5.5% maximum increase in economy fares. New formula: $29.50 + 8.25¢ for all mileages. FC = 160% of economy.	5/1/78	3.0% increase in coach formula: $17.37 + 9.50¢ + 7.24¢ + 6.96¢ (same mileages as 1/1/77). FC = 150-63% of coach.
		5/19/78	FC decreased to 130% of coach.
		9/5/78	First class/coach fare ratio abolished. Several carriers decreased first-class fares to 120% of coach starting in late November 1978.
		11/10/78	2.5% increase in coach formula: $17.81 + 9.73¢ + 7.42¢ + 7.19¢ (same mileages as 1/1/77).
		1/8/79	0.7% increase in coach formula thereby completing the 3.2% increase authorized 10/27/78: $17.93 + 9.80¢ + 7.48¢ + 7.19¢ (same mileages as 1/1/77).

Sources: CAB (j), (l) and (m); CTC(A) (a) and (b); Glasspoole, G.C. (Pricing Director, Air Canada), letter to the Secretary, CTC(A), Jan. 27, 1978; Papillon, R.C. [Acting Secretary, CTC(A)], letter to W.A. Jordan, April 29, 1977

Table A.2

Summary of the Passenger Fares per Mile
Authorized by State Regulatory Commissions for
Air Florida, PSA and Southwest, 1977-78

Fares per Mile					
Air Florida		PSA		Southwest	
As of 1/1/77	13.62-10.80¢ Standard,[a] 6.81-5.74¢ Pleasure.[b]	As of 1/1/77	10.40-6.63¢	As of 1/1/77	12.06-8.09¢ Executive,[c] 7.23-5.05¢ Pleasure.[d]
		5/12/77	10.58-6.69¢		
7/20/77	13.62-11.49¢ Standard,[a] 8.17-5.74¢ Pleasure.[b]				
12/13/77	14.98-11.95¢ Executive,[a] 9.08-6.89¢ Pleasure.[b]	1/1/78	11.30-7.25¢		
5/2/78	15.44-12.18¢ Executive,[a] 9.08-6.89¢ Pleasure.[b]				
				7/1/78	13.51-8.69¢ Executive,[c] 8.68-5.66¢ Pleasure.[d]
		8/4/78	12.74-8.29¢		
9/8/78	15.89-12.41¢ Executive,[a] No change in Pleasure.[b]				
12/14/78	17.70-13.79¢ Standard,[e] 8.62-6.89¢ Economy.[f]				

Table A.2 (continued)

Sources: Air Florida (e), 9th through 11th rev. p. 8; Air Florida (f), original through 16th rev. p. 8; ATPC (a), (d) and (e); PUC (a); Southwest (a), 1977, p. 12, (q) and (j), pp. 3, 4, 7 and 9

[a]In effect on all flights scheduled to depart during weekdays from 7:01 a.m. to 6:59 p.m.

[b]In effect on all flights scheduled to depart during weekdays from 7:00 p.m. to 7:00 a.m. and any time on Saturdays and Sundays

[c]In effect on all flights scheduled to depart during weekdays from 6:30 a.m. to 6:59 p.m.

[d]In effect on all flights scheduled to depart during weekdays from 7:00 p.m. to 6:29 a.m. and any time on Saturdays and Sundays

[e]In effect on all standard class flights. Does not apply when economy fares are available

[f]In effect on flights designated as economy. The number of passengers carried on any given flight at these fares shall be limited (i.e., capacity controlled).

Appendix B

EFFECTS OF EXCHANGE FLUCTUATIONS ON DOMESTIC PRICES

An analogy may be helpful in explaining why converting U.S. domestic airline fares into Canadian dollars does not necessarily yield greater accuracy in comparing the domestic fares in the two countries. Consider some ordinary physical good, such as fresh carrots. A reduction in the value of the Canadian dollar relative to the U.S. dollar will result in a roughly proportional increase in the price of U.S.-grown carrots to the Canadian consumer, but it is unlikely that it will yield an equal increase in the Canadian dollar price of Canadian-grown carrots. Certainly, higher prices for U.S. carrots increases demand for Canadian carrots (a close substitute) which should increase the price of Canadian carrots if supply is relatively inelastic and if carrot prices are free to respond to supply and demand relationships. But this Canadian price increase is due to increased demand for a close substitute following the exchange fluctuation which resulted in higher Canadian prices for U.S. carrots, and it would not be as great as the exchange fluctuation.

The relevant characteristics of carrots differ somewhat from those of air transportation. First, U.S. domestic air transportation is not as close a substitute for Canadian domestic air transportation as U.S. carrots are for Canadian carrots. The average consumer would have trouble differentiating between Canadian and U.S. carrots in the absence of appropriate labeling. The same consumer would, however, have no difficulty in differentiating between a trip from Toronto to Vancouver and one from Buffalo to Seattle, let alone between a trip from St. John's to Halifax as opposed to one from Albany to Raleigh/Durham. Thus, exchange rate fluctuations will have much less effect on Canadian domestic air transport demand (and fares) through the substitution effect than would be the case for carrots.

Second, it seems likely that the supply of air transportation is more elastic than the supply of carrots in the short-run (at least within a single crop year). Increased demand for air transportation can be met initially by operating at higher load factors, by scheduling more flights (or by rearranging schedules to yield a higher proportion of relatively more productive long-haul flights at the expense of short-haul flights), by installing more seats in existing aircraft and so forth. Thus, even if exchange rate fluctuations did result in an appreciable increase in demand for Canadian domestic air transportation, the price effects would probably be less than in the case of carrots with their less elastic supply.

Third, Table A.1 shows that Canadian airline fares were rather rigid in 1977 and 1978, with just one change in each of those two years. Obviously, Canadian domestic fares did not respond to every exchange rate fluctuation. This does not mean that they were fixed in real terms. Not only did inflation reduce prices over time, but increases in the Canadian dollar prices of U.S. imports (including U.S. domestic air transportation) decreased somewhat the prices of all domestic Canadian products relative to the prices of the U.S. imports. It should also be noted, however, that higher import prices reduced the real incomes of Canadian residents, thereby lowering the demand for Canadian domestic air transportation and other normal goods produced in Canada.

Finally, exchange fluctuations do have an effect on Canadian airline costs to the extent that airlines purchase inputs (such as aircraft) from the United States. Higher input prices increase the cost of supplying domestic air services which, in turn, increase domestic fares measured in Canadian dollars. This, again, is a secondary effect that is expressed through explicit changes in Canadian dollars, and not through conversions using current exchange rates.

It seems proper to conclude that exchange rate fluctuations do affect the prices of domestic goods, but to different degrees. The prices of internationally traded products (such as nickel and newsprint) are affected most quickly and roughly in line with the extent of changes in the exchange rate so that the Canadian and U.S. prices are about equal, after adjusting for exchange rates and transportation costs. Manufactured products and services (including air transportation) produced domestically, in contrast, are affected much less and any changes would be slow in occurring, especially for goods whose supplies are relatively elastic. Therefore, while making no adjustment for exchange rate differences probably overstates somewhat Canadian domestic fares relative to U.S. domestic fares, adjusting U.S. or Canadian domestic fares by the full amount of the then current exchange rate errs on the other side, making Canadian domestic fares appear lower (since 1977) than they actually have been relative to U.S. domestic fares.

Appendix C

OPERATING REVENUES, EXPENSES AND NET INCOME
AFTER TAXES BY AREA OF OPERATION, 1977-78,
AND TOTAL SYSTEM, 1975-78

Table C.1

Operating Revenues, Expenses and Net Income After Taxes
by Area of Operation, 1977-78, and Total System, 1975-78
Canadian Mainline, Regional and Selected U.S. Carriers

Carrier	Canadian or U.S. Dollars (000)					
	Total Operating Revenues	Total Operating Expenses	After Tax Income	Total Operating Revenues	Total Operating Expenses	After Tax Income
	1977			1978		
A. North America						
Mainline[a]						
Air Canada	905,956[b]	n.a.	n.a.	997,500[b]	n.a.	n.a.
CP Air	213,948[b]	n.a.	n.a.	248,467	n.a.	n.a.
Trunk						
Trans World	1,546,367	1,573,520	(43,015)	1,628,476	1,626,034	(7,203)
Northwest	771,380	685,907	71,595	562,559[b]	511,652[b]	46,327[b]
Delta	1,845,770	1,673,650	114,713	2,168,043	1,951,453	130,107
Intrastate	Same as Total System (see below)					
Regional[a]						
East. Prov.	42,139[b]	n.a.	n.a.	52,029	n.a.	n.a.
Nordair	47,470[b]	n.a.	n.a.	51,240[b]	n.a.	n.a.
Pac. Western	111,164[b]	n.a.	n.a.	129,561[b]	n.a.	n.a.
Quebecair	46,111[b]	n.a.	n.a.	54,691[b]	n.a.	n.a.
Transair	35,747[b]	n.a.	n.a.	40,365	n.a.	n.a.
Local Service	Same as Total System (see below)					
B. International						
Mainline[a]						
Air Canada	285,425[b]	n.a.	n.a.	324,980	n.a.	n.a.
CP Air	179,618[b]	n.a.	n.a.	217,362	n.a.	n.a.
Trunk						
Trans World	765,560	696,075	64,821[c]	846,248	799,625	81,254[c]
Northwest	279,094	259,317	21,123	231,802[b]	214,771[b]	15,514[b]
Delta	38,956	35,619	1,851	70,564	61,762	4,929
Intrastate	0	0	0	0	0	0
Regional[a]						
East. Prov.	125[b]	n.a.	n.a.	0	0	0
Nordair	14,489[b]	n.a.	n.a.	16,167[b]	n.a.	n.a.
Pac. Western	14,140[b]	n.a.	n.a.	12,769[b]	n.a.	n.a.
Quebecair	17,415[b]	n.a.	n.a.	19,259[b]	n.a.	n.a.
Transair	3,064[b]	n.a.	n.a.	3,260	n.a.	n.a.
Local Service	0	0	0	0	0	0
	1975[g]			1976[g]		
C. Total System						
Mainline						
Air Canada	957,180	917,876	(12,743)	1,057,484[b]	1,017,719[b]	(10,455)[b]
CP Air	331,806	329,018	(6,399)	350,048[b]	353,349[b]	(9,803)[b]

Table C.1 (continued)

Carrier	Thousands of Canadian or U.S. Dollars (000)					
	Total Operating		After Tax	Total Operating		AfterTax
	Revenues	Expenses	Income	Revenues	Expenses	Income
	1975[g]			1976[g]		
Trunk						
Trans World	1,805,176	1,886,863	(79,683)[c]	2,039,145	1,985,857	18,773[c]
Northwest	814,860[b]	764,941[b]	43,396[b]	971,069	867,684	51,737
Delta	1,407,279	1,358,096	37,385	1,629,101	1,501,352	84,149
Intrastate						
Air Calif.	37,553	35,213	1,434	47,125	44,150	1,412
Air Florida[d]	2,664	3,086	(629)	2,820	3,232	(671)
PSA[e]	152,521	147,537	(8,379)	166,874	155,236	2,952
Southwest	22,817	17,860	3,400	30,920	23,236	4,939
Regional						
East. Prov.	33,080	35,641	(176)	35,346[b]	39,476[b]	(1,000)[b]
Nordair	44,740	42,484	1,206	54,489[b]	51,816[b]	1,042[b]
Pac. Western	101,572	97,378	1,360	101,316[b]	98,483[b]	2,292[b]
Quebecair	43,683	43,648	(286)	45,570[b]	45,989[b]	(910)[b]
Transair	28,936[b]	28,427[b]	(2,877)[b]	37,601[b]	35,266[b]	(4,691)[b]
Local Service						
Allegheny	377,147	373,941	(9,886)	439,050	420,915	6,119
Frontier	167,794	156,228	6,799	204,163	183,169	11,470
N. Central	163,584	156,363	5,224	191,108	177,079	7,448
Southern	118,071	114,665	557	140,167	137,675	405
	1977			1978		
	C. Total System					
Mainline[a]						
Air Canada	1,187,655[b]	1,098,528[b]	20,006[b]	1,322,587[b]	1,238,098[b]	47,485[b]
CP Air	393,585[b]	372,673[b]	3,340[b]	465,829	421,985	20,872
Trunk						
Trans World	2,311,927	2,269,595	21,806[c]	2,474,724	2,425,659	74,051[c]
Northwest	1,050,474	945,224	92,719	794,361[b]	726,424[b]	61,841[b]
Delta	1,884,726	1,709,269	116,564	2,238,606	2,013,216	135,035
Intrastate						
Air Calif.	55,028	50,013	2,242	67,646	63,868	2,219
Air Florida[d]	4,745	7,325	(2,610)	16,882	16,569	132
PSA[e]	191,856	182,797	2,099	229,885	215,683	9,618
Southwest	49,047	38,785	7,545	81,065	59,943	17,004
Regional[a]						
East. Prov.	42,351[b]	44,112[b]	(942)[b]	52,029	50,064	3,245
Nordair	61,958[b]	55,705[b]	2,996[b]	67,407[b]	61,162[b]	5,404[b]
Pac. Western	125,308[b]	120,579[b]	2,946[b]	142,330[b]	132,860[b]	7,670[b]
Quebecair	64,667[b]	61,974[b]	1,171[b]	73,943[b]	72,311[b]	(217)[b]
Transair	38,531[b]	35,629[b]	841[b]	43,655	40,542	231
Local Service						
Allegheny	500,153	474,017	16,412	566,753	532,590	32,737
Frontier	236,572	210,212	13,824	287,229	274,024	13,652
N. Central	227,628	209,990	13,767	298,523	263,748	22,164
Southern[f]	159,511	151,987	8,253	188,512	180,808	2,403

(cont.)

Table C.1 (continued)

Sources: Air California (a), 1976, p. 10 and (e); Air Florida (a), 1978, p. 2; CAB (b), 1976 and 1978; Culley, E.K., Director, Passenger and Aviation Economics, CTC (Research), letter to D.F. McKinley (Research Coordinator, Consumer and Corporate Affairs Canada), Aug. 17, 1979; PSA (a), 1978, p. 14 and (j); Southwest (a), 1978, p. 8; SC(ASC) (a)

n.a. -- not available because the data submitted by the carriers in CTC(A) Statement 16, "Mainline Carriers, Route Analysis," is considered to be confidential and the CTC(A) has prohibited its use in this study in any way that would "divulge, directly or indirectly, route expense information by carriers." This prohibition even includes carrier expense data aggregated by area of operation.

[a]Total system non-flying services (net) revenues allocated between the two areas of operation on the basis of each area's per cent of total passenger, cargo and excess baggage revenues. North American and International operating revenues for Canadian carriers may not add up to total system figures. The data for areas of operation were obtained from SC(ASC) computer printouts which used revised information in Statistics Canada's data bank. All total system data are as originally reported in SC(ASC) (a).

[b]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[c]Excludes international nontransport net income after income taxes of $6,595(000) for 1975, $18,061(000) for 1976, $42,990(000) for 1977 and $9,883(000) for 1978

[d]Fiscal years ended July 31, 1975-78

[e]Includes revenues and expenses for the following PSA, Inc. subsidiaries in addition to the airline: Pacific Southwest Airmotive (maintenance services), Airline Training Center and Jetair Leasing, Inc. Airline revenues were 88.5 per cent of corporate total in 1977 and 89.7 per cent in 1978, while Airmotive (maintenance) revenues were 9.3 and 8.2 per cent of total for these two years.

[f]Includes a small amount of international service (one daily round trip) between Miami and Grand Cayman, B.W.I.

[g]The breakdown of revenue data by area of operation is not readily available for the Canadian carriers. Therefore, only total system data are presented in this appendix for 1975 and 1976.

Appendix D

STRIKES HAVING A SIGNIFICANT IMPACT ON AIRLINE OPERATIONS, 1969-78

Table D.1

Strikes Having a Significant Impact on Airline Operations
Canadian Mainline, Regional and Selected U.S. Carriers
1969-78

A. Canada

All Mainline & Regional Carriers

Jan. 17 to Jan. 28, 1972 -- TC air traffic controllers
Feb. 6 to Mar. 7, 1972 -- TC electronic technicians (rotating)
Apr. 5 to Apr. 26, 1974 -- TC fire fighters (rotating)
June 20 to June 28, 1976 -- pilots
Aug. 7 to Aug. 11, 1977 -- TC air traffic controllers

Air Canada

Apr. 21 to May 20, 1969 -- mechanics and ground service personnel
June 1 to June 22, 1973 -- mechanics and ground service personnel (rotating)
Aug. 25 to Sep. 5, 1978 -- pilots and ground personnel

CP Air

July 25 to Sep. 22, 1973 -- mechanics and ground service personnel

Eastern Provincial

Aug. 31 to Sep. 26, 1976 -- flight attendants

Nordair

Nov. 15, 1972 to Jan. 20, 1973 -- mechanics and ground service personnel
Oct. 24 to Oct. 28, 1978 -- pilots

Pacific Western

Mar. 23 to Apr. 17, 1978 -- ground service personnel (rotating)

Quebecair

Oct. 29 to Nov. 30, 1978 -- flight attendants (locked out)

Transair

Mar. 7 to June 3, 1975 -- mechanics and traffic/reservations agents

B. United States

Northwest

July 8 to Dec. 18, 1970 -- clerical, office, fleet and passenger service
June 30 to Oct. 2, 1972 -- pilots
Aug. 4 to Aug. 7, 1975 -- pilots
Apr. 29 to Aug. 14, 1978 -- pilots

Trans World

Nov. 5 to Dec. 20, 1973 -- flight attendants

PSA

Nov. 15 to Dec. 23, 1973 -- mechanics

Sources: Bairstow, 1978, Table 3; CAB (c), Dec. 1978, p. 89, (i), p. 576, (p), Nov. 1975, p. 178 and Dec. 1977, p. 167; PSA (b), Exhibit A, p. 14; SC(ASC) (e), 1970, p. vi, 1973, p. vi, 1975, p. vi, 1977, p. ix and 1978, p. ix; Globe and Mail, Dec. 1, 1978, p. B18

Appendix E

REVENUE TON-MILES BY AREA OF OPERATION, 1975-78

Table E.1

Revenue Ton-Miles by Area of Operation
Air Canada and CP Air, 1975-78

Year	Revenue Ton-Miles (000)[a]									
	Air Canada					CP Air				
	Passenger[b]		Cargo[c]			Passenger[b]		Cargo[c]		
	Scheduled	Charter	Scheduled	Charter	Total	Scheduled	Charter	Scheduled	Charter	Total
					A. Domestic					
1975	584,611	744	134,998	61	720,414	164,499	580	36,213	0	201,292
1976	591,726	1,474	143,085	0	736,285[d]	160,976	523	41,010	0	202,509[d]
1977	601,501	4,212	140,587	0	746,300[d]	157,203	670	39,127	0	197,000[d]
1978	639,969	1,273	143,911	92	785,245[d]	179,697	3,227	44,009	0	226,933
					B. Transborder					
1975	153,782	1,282	29,150	2	184,216	70,718	1,303	7,240	0	79,261
1976	182,692	4,486	34,939	53	222,170[d]	74,459	8,985	8,127	0	91,571[d]
1977	190,914	7,778	36,393	0	235,085[d]	72,821	8,383	7,937	0	89,141[d]
1978	209,572	11,314	38,874	39	259,799[d]	76,877	2,739	7,905	0	87,521
					C. North America (A+B)					
1975	738,392	2,026	164,148	63	904,629	235,217	1,883	43,453	0	280,553
1976	774,418	5,960	178,024	53	958,455[d]	235,435	9,508	49,137	0	294,080[d]
1977	792,414	11,990	176,980	0	981,384[d]	230,024	9,053	47,064	0	286,141[d]
1978	849,541	12,587	182,785	131	1,045,044[d]	256,574	5,966	51,914	0	314,454
					D. International					
1975	272,615	76,153	125,287	17,461	491,516	189,889	15,591	64,823	0	270,303
1976	296,086	50,365	133,441	19,851	499,743[d]	185,335	28,615	70,877	0	284,827[d]
1977	337,255	31,023	137,711	21,049	527,038[d]	201,931	48,995	63,006	0	313,932[d]
1978	352,188	41,922	157,700	11,910	563,720[d]	217,490	55,406	70,494	0	343,390
					E. Total System					
1975	1,011,008	78,179	289,436	17,524	1,396,146	425,106	17,474	108,276	0	550,856
1976	1,070,504	56,325	311,465	19,904	1,458,198[d]	420,770	38,123	120,014	0	578,906[d]
1977	1,129,669	43,012	314,691	21,049	1,508,422[d]	431,955	58,048	110,070	0	600,073[d]
1978	1,201,730	54,509	340,484	12,040	1,608,763[d]	474,064	61,372	122,408	0	657,844

Sources: SC(ASC) (i), (o) and (s)

[a]Individual figures may not add up to totals because of rounding.

[b]Based on revenue passenger-miles assuming a standard weight of 200 pounds per passenger (including all baggage); i.e., RPM x.1 = RTM

[c]Freight, express and mail. Excludes excess baggage which is part of passenger RTM.

[d]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

Table E.2

Revenue Ton-Miles by Area of Operation
Trans World, Northwest and Delta, 1975-78

Year	Revenue Ton-Miles (000)[a]									
	Trans World					Northwest				
	Passenger[b]		Cargo[c]			Passenger[b]		Cargo[c]		
	Scheduled	Charter	Scheduled	Charter	Total	Scheduled	Charter	Scheduled	Charter	Total
					A. North America					
1975	1,438,841	53,619	352,226	47	1,844,733	693,439	10,931	301,295	1,662	1,007,326[d]
1976	1,528,240	92,265	366,239	18	1,986,761	792,032	16,367	335,642	604	1,144,644
1977	1,611,257	75,938	363,801	936	2,051,934	816,801	18,761	334,009	64	1,169,635[d]
1978	1,763,525	32,439	315,216	805	2,111,985	490,152	12,385	199,498	88	702,123
					B. International					
1975	656,850	99,706	232,412	16,142	1,005,111	253,689	41,059	179,959	12,636	487,344[d]
1976	701,294	100,266	225,451	15,002	1,042,012	283,836	34,993	235,808	6,706	561,344
1977	774,367	111,183	225,162	35,791	1,146,503	293,240	35,714	232,420	190	561,564
1978	933,210	91,427	235,669	42,426	1,302,733	211,678	7,795	178,354	302	398,130[d]
					C. Total System					
1975	2,095,691	153,325	584,638	16,189	2,849,844	947,128	51,990	481,254	14,298	1,494,670[d]
1976	2,229,534	192,531	591,690	15,020	3,028,773	1,075,868	51,360	571,450	7,310	1,705,988
1977	2,385,624	187,121	588,963	36,727	3,198,437	1,110,041	54,475	566,429	254	1,731,199
1978	2,696,735	123,866	550,885	43,231	3,414,718	701,830	20,180	377,852	390	1,100,253[d]

Year	Delta				
	Passenger[b]		Cargo[c]		
	Scheduled	Charter	Scheduled	Charter	Total
		A. North America			
1975	1,605,640	2,219	229,405	1	1,837,264
1976	1,719,065	28,525	263,490	0	2,011,081
1977	1,865,543	31,343	280,411	0	2,177,297
1978	2,240,075	44,934	288,065	0	2,573,074
		B. International			
1975	40,406	382	6,192	0	46,981
1976	43,278	2,138	7,106	0	52,522
1977	46,422	952	8,012	0	55,386
1978	93,151	7,114	9,180	0	109,444[e]
		C. Total System			
1975	1,646,046	2,601	235,597	1	1,884,245
1976	1,762,343	30,663	270,596	0	2,063,603
1977	1,911,965	32,295	288,423	0	2,232,683
1978	2,333,226	52,048	297,244	0	2,682,518[e]

Sources: CAB (c), Dec. 1978, and (p), Dec. 1977

a, b, c, [d]See notes to Table E.1.

[e]Delta's North Atlantic international service inaugurated April 30, 1978

Table E.3

Revenue Ton-Miles -- Total System[a]
Air California, Air Florida, PSA and Southwest, 1975-78

Year	Revenue Ton-Miles (000)[a]				
	Passenger[b]		Cargo[c]		
	Scheduled	Charter	Scheduled	Charter	Total
			A. Air California		
1975	55,323	n.a.	n.a.	0	56,500[d]
1976	66,740	n.a.	n.a.	0	68,100[d]
1977	75,943	810[e]	634[g]	0	77,387
1978	81,295	2,320[f]	709[g]	0	84,324
			B. Air Florida		
1975	2,506	n.a.	3[j]	0	n.a.
1976	1,718	n.a.	5[j]	0	n.a.
1977	8,407	822[h]	28[j]	0	9,317[h]
1978	18,106	1,900[i]	85[j]	0	20,091
			C. PSA		
1975	202,201	240[k]	2,546[l]	0	204,987
1976	208,604	240[k]	3,322[l]	0	212,166
1977	231,283	1,440[k]	3,813[l]	0	236,536
1978	248,218	1,300[k]	4,919[l]	0	254,537
			D. Southwest		
1975	29,846	80[m]	220[n]	0	30,146
1976	40,627	170[m]	270[n]	0	41,067
1977	67,567	240[m]	450[n]	0	68,257
1978	104,862	270[m]	700[n]	0	105,832

Sources: Table F.3; Air California (b), pp. 18-19 and (c), Appendix A; Air Florida (n), p. 10 and (o); Air Transport World, March 1979, p. 99; PSA (c); Southwest (b) and (h), Schedules C.1 and F

[a]North America, except for Air Florida's charter service (see note h, Table F.3)

[b]Based on revenue passenger-miles, assuming a standard weight of 200 pounds per passenger (including all baggage); i.e., RPM x .1 = RTM

[c]Primarily freight. Only PSA carried mail during these years. Excludes excess baggage

[d]Estimated by dividing passenger RTM by .98 as derived from 1977 data

[e]Air California's charter revenues for 1977 were 1.064 per cent of scheduled passenger revenues. Charter passenger RTM were estimated by applying this percentage to scheduled passenger RTM and rounding to the nearest 10(000) RTM.

[f]Air California's charter revenues for the first ten months of 1978 were 2.853 per cent of scheduled passenger revenues. Charter passenger RTM were estimated by applying this percentage to scheduled passenger RTM and rounding to the nearest 10(000) RTM.

Table E.3 (continued)

[g]Based on pounds of freight carried times average distance of 338 miles per shipment estimated from average passenger distance flown

[h]Estimated

[i]Air Florida operated 756.78 airborne hours of charter services during 1978. This equaled 7.03 per cent of the 10,754.5 airborne hours it operated in scheduled passenger service. Expanding this percentage on the assumption of an 80 per cent charter load factor, rather than the 53.4 per cent achieved in scheduled passenger service, yields an estimated charter RTM equal to 10.5 per cent of scheduled passenger RTM.

[j]Estimated from annual freight revenues, average freight rate and average distance per shipment derived from average passenger distances

[k]PSA's charter revenues for 1975-78 were 0.116, 0.114, 0.620 and 0.522 per cent of total passenger revenues. Charter passenger RTM for 1975-78 were estimated by applying these percentages to total passenger RTM and rounding to the nearest 10(000) RTM.

[l]Based on pounds of freight and mail carried times average distances estimated by PSA: Freight, 317 miles (1975-76) and 320 miles (1977-78); Mail, 337 miles

[m]Southwest's charter revenues for 1975-78 were 0.267, 0.418, 0.361 and 0.258 per cent of total annual passenger revenues. Charter passenger RTM were estimated by applying these percentages to scheduled passenger RTM and rounding to the nearest 10(000) RTM.

[n]Estimated from average freight revenue per trip flown of $43.13, $38.78, $37.22 and $43.12 for the four years. Freight rates were $20 for 0-50 pounds, $25 for 51 to 100 pounds and 15¢ per pound over 100 pounds. Therefore, it was assumed that an average of 100 pounds were carried per flight and this estimated weight was multiplied by annual revenue plane miles flown to yield estimated annual RTM.

Table E.4

Revenue Ton-Miles by Area of Operation
Eastern Provincial, Nordair, Pacific Western, Quebecair and Transair, 1975-78

Year	Revenue Ton-Miles (000)[a]									
	Eastern Provincial					Nordair				
	Passenger[b]		Cargo[c]			Passenger[b]		Cargo[c]		
	Scheduled	Charter	Scheduled	Charter	Total	Scheduled	Charter	Scheduled	Charter	Total
					A. Domestic					
1975	23,622	118	3,733	26	27,499	12,639[e]	668	10,272[e]	1,815	25,394
1976	22,233	238	3,804	0	26,275[f]	13,664[e]	913	11,985[e]	849	27,411[f]
1977	25,471	542	3,803	5	29,821[f]	14,641[e]	1,323	13,314[e]	1,119	30,397[f]
1978	29,319	1,182	4,778	0	35,279	15,624[e]	1,760	13,033[e]	1,429	31,846[f]
					B. Transborder					
1975	155[d]	8,449	0	0	8,604	532[e]	9,421	34[e]	10	9,997
1976	218[d]	10,123	0	0	10,341[f]	555[e]	11,857	43[e]	57	12,512[f]
1977	244[d]	7,800	0	0	8,044[f]	544[e]	17,834	46[e]	152	18,576[f]
1978	251[d]	7,662	0	0	7,913	610[e]	15,351	44[e]	56	16,061[f]
					C. North America (A+B)					
1975	23,777	8,568	3,733	26	36,104	13,171	10,089	10,306	1,825	35,391
1976	22,451	10,361	3,804	0	36,616[f]	14,218	12,770	12,028	906	39,922[f]
1977	25,715	8,342	3,803	5	37,865[f]	15,185	19,157	13,360	1,271	48,973[f]
1978	29,570	8,844	4,778	0	43,192	16,234	17,111	13,078	1,484	47,907[f]
					D. International					
1975	0	0	0	0	0	0	20,575	0	65	20,640
1976	0	0	0	0	0[f]	0	33,463	0	91	33,554[f]
1977	0	58	0	0	58[f]	0	35,589	0	507	36,096[f]
1978	0	0	0	0	0	0	36,668	0	327	36,995[f]
					E. Total System					
1975	23,777	8,568	3,733	26	36,104	13,171	30,664	10,306	1,889	56,030
1976	22,451	10,361	3,804	0	36,616[f]	14,218	46,233	12,028	996	73,475[f]
1977	25,715	8,400	3,803	5	37,923[f]	15,185	54,746	13,360	1,777	85,069[f]
1978	29,570	8,844	4,778	0	43,192	16,234	53,779	13,078	1,811	84,901[f]

Table E.4 (continued)

Year	Revenue Ton-Miles (000)[a]									
	Pacific Western					Quebecair				
	Passenger[b]		Cargo[c]			Passenger[b]		Cargo[c]		
	Scheduled	Charter	Scheduled	Charter	Total	Scheduled	Charter	Scheduled	Charter	Total
					A. Domestic					
1975	46,069	2,809	13,856	18,135	80,869	17,249	148	2,061	4,815	24,273
1976	47,042	4,148	13,577	12,013	76,780[f]	17,566	539	2,147	4,245	24,497[f]
1977	52,225	5,221	13,609	17,457	88,512[f]	18,541	3,496	2,113	7,339	31,489[f]
1978	53,785	7,317	12,516	18,695	92,313[f]	18,698	7,160	2,405	6,317	34,580[f]
					B. Transborder					
1975	1,631	10,025	121	1,425	13,202	0	7,418	0	0	7,418
1976	1,347	16,128	100	91	17,666[f]	0	5,910	0	0	5,910[f]
1977	1,988	23,101	95	326	25,510[f]	0	7,053	0	0	7,053[f]
1978	2,062	19,960	93	8	22,123[f]	0	8,461	0	0	8,461[f]
					C. North America (A+B)					
1975	47,700	12,834	13,977	19,561	94,072	17,249	7,566	2,061	4,815	31,691
1976	48,390	20,276	13,677	12,104	94,447[f]	17,566	6,449	2,147	4,245	30,407[f]
1977	54,212	28,322	13,704	17,783	114,021[f]	18,541	10,549	2,113	7,339	38,542[f]
1978	55,847	27,278	12,609	18,703	114,437[f]	18,698	15,621	2,405	6,317	43,041[f]
					D. International					
1975	0	8,682	0	30,484	39,166	0	33,488	0	0	33,488
1976	0	11,[illegible]0	0	12,841	24,321[f]	0	28,991	0	0	28,991[f]
1977	0	24,4[illegible]6	0	7,711	32,127[f]	0	41,798	0	0	41,798[f]
1978	0	26,621	0	1,543	28,164[f]	0	43,991	0	0	43,991[f]
					E. Total System					
1975	47,700	21,516	13,977	50,044	133,237	17,249	41,053	2,061	4,815	65,178
1976	48,390	31,756	13,677	24,945	118,768[f]	17,566	35,439	2,147	4,245	59,397[f]
1977	54,212	52,737	13,704	25,493	146,147[f]	18,541	52,347	2,113	7,339	80,341[f]
1978	55,848	53,898	12,609	20,246	142,601[f]	18,698	59,612	2,405	6,317	87,032[f]

(cont.)

Table E.4 (continued)

Year	Revenue Ton-Miles (000s)[a] Transair Passenger[b] Scheduled	Passenger[b] Charter	Cargo[c] Scheduled	Cargo[c] Charter	Total
	A. Domestic				
1975	15,341	945	1,946	1,800	20,032[f]
1976	18,932	832	2,548	2,275	24,587[f]
1977	20,578	1,741	2,609	1,828	26,756[f]
1978	22,920	2,554	2,648	2,617	30,739
	B. Transborder				
1975	0	3,745	0	18	3,763[f]
1976	0	6,248	0	0	6,248[f]
1977	0	7,052	0	0	7,052[f]
1978	0	9,142	0	0	9,142
	C. North America (A+B)				
1975	15,341	4,690	1,946	1,818	23,795[f]
1976	18,932	7,080	2,548	2,275	30,835[f]
1977	20,578	8,793	2,609	1,828	33,808[f]
1978	22,920	11,696	2,648	2,617	39,881
	D. International				
1975	0	7,308	0	214	7,522[f]
1976	0	14,337	0	29	14,366[f]
1977	0	7,099	0	0	7,099[f]
1978	0	7,191	0	0	7,191
	E. Total System				
1975	15,341	11,998	1,946	2,032	31,318[f]
1976	18,932	21,417	2,548	2,304	45,201[f]
1977	20,578	15,892	2,609	1,828	40,907[f]
1978	22,920	18,887	2,648	2,617	47,071

Sources: Same as for Table E.1 plus Nordair (a), 1976, Appendix 10 with supplemental notes; SC(ASC), telephone conversation with G. Baldwin correcting PWA charter RTM, Feb. 12, 1980

[a]Individual figures may not add up to totals because of rounding.

[b]Based on revenue passenger-miles assuming a standard weight of 200 pounds per passenger (including all baggage); i.e., RPM x .1 = RTM

[c]Freight, express and mail. Excludes excess baggage which in no instance exceeded 0.5 per cent of total RTM

[d]St. Pierre and Miquelon

[e]Partially estimated. Nordair does not report its scheduled traffic separately for domestic and transborder operations. Instead, it reports on the basis of northern routes (between Montreal and points in Quebec and the Northwest Territories) and southern routes (between Montreal, Ottawa, Hamilton, Windsor and Pittsburgh). On-line origin/destination passenger data for 1975 and 1976 show that Nordair's Hamilton-Pittsburgh transborder segment accounted for 9.9 per cent of its total southern RPM in 1975 and 10.4 per cent in 1976. Applying these percentages, plus an assumed 10 per cent for 1977 and 1978, to the reported southern passenger and cargo RTM yields the transborder estimates given in the body of this appendix. The remaining southern RTM plus the reported northern passenger and cargo RTM yield the domestic estimates. The reported data are as follows:

Year	Northern Scheduled Passenger	Northern Scheduled Cargo	Southern Scheduled Passenger	Southern Scheduled Cargo
1975	7,802	9,964	5,369	342
1976	8,880	11,615	5,339	413
1977	9,743	12,898	5,442	462
1978	10,133	12,634	6,101	443

[f]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

Table E.5

Revenue Ton-Miles -- Total System[a]
Allegheny, Frontier, North Central and Southern, 1975-78

Year	Revenue Ton-Miles (000)[b]				
	Passenger[c]		Cargo[d]		
	Scheduled	Charter	Scheduled	Charter	Total
			A. Allegheny		
1975	327,221	3,228	32,788	0	363,237
1976	349,691	11,289	34,875	0	395,854
1977	364,287	10,451	35,530	0	410,269
1978	408,342	16,000	37,214	0	461,556
			B. Frontier		
1975	145,530	22	14,936	0	160,488
1976	167,991	25	16,979	0	184,996
1977	188,745	33	19,219	0	207,996
1978	237,793	359	20,768	0	258,919
			C. North Central		
1975	102,915	4,249	11,703	-[e]	118,867
1976	110,881	7,033	13,042	11	130,967
1977	128,107	11,133	13,997	0	153,238
1978	171,413	21,132	16,576	0	209,122
			D. Southern		
1975	85,255	13,021	7,344	0	105,620
1976	97,899	14,597	8,484	0	120,980
1977	104,482	14,657	9,347	0	128,487
1978	133,499	10,369	10,443	0	154,311

Sources: CAB (c), Dec. 1978 and (p), Dec. 1977

[a]Essentially North America

[b]Individual figures may not add up to totals because of rounding.

[c]Based on revenue passenger-miles assuming a standard weight of 200 pounds per passenger (including all baggage); i.e., RPM x .1 = RTM

[d]Freight, express and mail. Excludes excess baggage which is part of passenger RTM

[e]Less than 500 RTM

Appendix F

REVENUES BY TRAFFIC CATEGORY AND AREA OF OPERATION, 1975-78

Table F.1

Revenues by Traffic Category and Area of Operation
Air Canada and CP Air, 1975-78

Year	Air Canada's Revenues in Dollars (000)[a]								
	Scheduled Passenger				Scheduled Cargo				Charter
	First-Class	Economy	Excess Bag.	Total	Mail	Frgt.	Exp.	Total	Total
				A. Domestic					
1975	34,891	457,938	1,330	494,159	10,985	29,022	20,718	60,725	496
1976[b]	35,369	506,524	1,485	543,378	13,555	29,885	18,987	62,427	1,001
1977[b]	26,797	600,252	1,846	628,895	14,286	33,136	21,727	69,150	2,636
1978[b]	24,875	650,001	896	675,772	14,790	37,373	24,455	76,618	863
				B. Transborder					
1975	13,355	114,220	501	128,076	907	10,084	448	11,439	1,150
1976[b]	14,752	137,215	599	152,567	1,343	12,306	615	14,264	2,035
1977[b]	12,834	148,649	678	162,161	1,314	14,006	953	16,273	3,662
1978[b]	14,649	177,373	395	192,417	1,551	15,631	1,377	18,559	5,927
				C. North America (A+B)					
1975	48,246	572,158	1,831	622,235	11,892	39,106	21,166	72,164	1,647
1976[b]	50,121	643,739	2,084	695,995	14,897	41,191	19,602	76,690	3,036
1977[b]	39,631	748,901	2,524	791,056	15,600	47,142	22,681	85,423	6,299
1978[b]	39,525	827,373	1,292	868,190	16,342	53,003	25,832	95,177	6,790
				D. International					
1975	11,850	154,184	1,286	167,321	7,958	30,144	0	38,102	35,170
1976[b]	13,680	168,785	1,641	184,106	10,078	32,028	0	42,105	25,976
1977[b]	16,075	198,044	1,772	215,891	10,715	32,797	0	43,512	19,161
1978[b]	15,238	222,894	1,011	239,143	10,829	42,295	0	53,153	24,359
				E. Total System					
1975	60,097	726,342	3,117	789,556	19,850	69,250	21,166	110,266	36,817
1976[b]	63,801	812,524	3,725	880,051	24,957	74,219	19,602	118,796	29,012
1977[b]	55,707	946,944	4,296	1,006,947	26,315	79,939	22,681	128,935	25,459
1978[b]	54,763	1,050,267	2,302	1,107,332	27,200	95,298	25,832	148,330	31,149

Table F.1 (continued)

Year	CP Air's Revenues in Dollars (000)[a]								
	Scheduled Passenger				Scheduled Cargo				Charter
	First-Class	Economy	Excess Bag.	Total	Mail	Frgt.	Exp.	Total	Total
				A. Domestic					
1975	11,560	110,868	305	122,733	1,494	6,664	2,795	10,953	343
1976[b]	12,007	119,767	312	132,088	2,102	7,710	2,609	12,420	283
1977[b]	9,700	135,180	386	145,266	2,664	8,391	2,781	13,836	494
1978	8,754	158,101	285	167,140	4,228	12,269	2,484	18,981	1,418
				B. Transborder					
1975	3,243	35,077	41	38,360	548	1,321	0	1,869	604
1976[b]	3,625	38,021	41	41,687	782	1,669	0	2,451	3,180
1977[b]	2,223	38,918	35	41,176	805	1,558	0	2,363	3,188
1978	2,081	44,769	25	46,875	863	1,724	0	2,587	1,426
				C. North America (A+B)					
1975	14,803	145,944	345	161,093	2,042	7,985	2,795	12,822	948
1976[b]	15,632	157,790	353	173,775	2,884	9,378	2,609	14,871	3,463
1977[b]	11,923	174,098	421	186,442	3,469	9,950	2,781	16,199	3,682
1978	10,836	202,870	309	214,015	5,091	13,993	2,484	21,568	2,845
				D. International					
1975	6,800	110,903	1,001	118,704	7,661	16,984	0	24,645	6,889
1976[b]	5,583	104,924	738	111,245	8,864	17,360	0	26,224	9,488
1977[b]	5,107	124,257	868	130,232	9,968	16,917	0	26,885	16,591
1978	5,995	147,725	431	154,151	9,467	22,023	0	31,490	23,810
				E. Total System					
1975	21,603	256,848	1,347	279,797	9,703	24,969	2,795	37,466	7,836
1976[b]	21,215	262,714	1,091	285,020	11,748	26,738	2,609	41,095	12,950
1977[b]	17,030	298,356	1,289	316,674	13,437	26,867	2,781	43,084	20,273
1978	16,831	350,594	740	368,166	14,558	36,016	2,484	53,058	26,655

Sources: SC(ASC) (h), (o) and (s)

[a]Individual figures may not add up to totals because of rounding.

[b]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

Table F.2

Revenues by Traffic Category and Area of Operation
Trans World, Northwest and Delta Airlines, 1975-78

Year	Scheduled Passenger				Scheduled Cargo				Charter
	First-Class	Coach	Excess Bag.	Total	Mail	Freight	Exp.	Total	Total
Trans World's Revenues in U.S. Dollars (000)[a]									
A. North America									
1975	137,157	894,737	1,450	1,033,344	19,619	76,134	2,534	98,287	21,402
1976	136,057	1,039,654	1,763	1,177,474	23,621	88,099	957	112,667	34,026
1977	140,696	1,170,444	1,828	1,312,968	26,081	97,261	1,730	125,072	29,906
1978	155,186	1,270,694	1,768	1,427,648	24,784	89,956	2,498	117,238	14,222
B. International									
1975	65,125	385,692	5,623	456,440	18,098	49,163	0	67,261	39,751
1976	69,330	417,961	7,181	494,472	15,344	49,113	0	64,457	39,129
1977	82,140	487,001	3,126	572,267	16,270	53,232	0	69,502	56,044
1978	85,144	552,280	2,219	639,643	18,112	55,903	0	74,015	55,422
C. Total System									
1975	202,282	1,280,429	7,073	1,489,784	37,718	125,297	2,534	165,549	61,153
1976	205,387	1,457,615	8,945	1,671,947	38,964	137,212	957	177,133	73,155
1977	222,837	1,657,445	4,954	1,885,236	42,350	150,494	1,730	194,574	85,949
1978	240,330	1,822,975	3,987	2,067,292	42,895	145,859	2,498	191,252	69,645
Northwest's Revenues in U.S. Dollars (000)[a]									
A. North America									
1975[b]	59,484	442,116	970	502,570	13,585	54,899	1,522	70,006	6,338
1976	64,227	529,557	1,263	595,047	14,928	71,200	566	86,694	8,199
1977	68,266	585,442	1,154	654,862	19,031	74,910	1,402	95,343	8,291
1978[b]	41,207	364,803	758	406,768	10,306	49,613	705	60,624	5,447
B. International									
1975[b]	14,031	141,696	322	156,049	9,695	30,594	0	40,289	19,423
1976	13,175	178,804	530	192,509	10,210	46,324	0	56,534	13,911
1977	14,815	192,530	691	208,036	10,862	43,028	0	53,890	13,325
1978[b]	13,530	137,861	783	152,174	8,638	35,217	0	43,855	3,041
C. Total System									
1975[b]	73,515	583,812	1,292	658,619	23,280	85,493	1,522	110,295	25,762
1976	77,401	708,361	1,793	787,555	25,137	117,523	566	143,226	22,110
1977	83,080	777,973	1,845	862,898	29,894	117,938	1,402	149,234	21,615
1978[b]	54,737	502,664	1,541	558,942	18,945	84,830	705	104,480	8,489

Table F.2 (continued)

Year	Delta's Revenues in U.S. Dollars (000)[a]								
	Scheduled Passenger				Scheduled Cargo				Charter
	First-Class	Coach	Excess Bag.	Total	Mail	Freight	Exp.	Total	Total
				A. North America					
1975	198,214	1,069,831	1,997	1,270,042	19,648	67,248	69	89,965	1,743
1976	197,402	1,248,332	2,169	1,447,803	23,209	80,363	2,997	106,569	11,118
1977	206,387	1,461,537	1,917	1,669,841	38,387	91,816	4,976	135,179	12,249
1978	216,367	1,751,607	2,036	1,970,010	28,754	107,506	7,760	144,020	21,078
				B. International					
1975	3,207	26,573	204	29,984	108	2,060	0	2,168	319
1976	3,089	29,464	139	32,692	141	2,091	27	2,259	1,511
1977	3,357	31,331	70	34,758	153	2,852	89	3,094	665
1978[c]	6,652	55,897	121	62,670	207	3,120	83	3,410	3,576
				C. Total System					
1975	201,422	1,096,405	2,201	1,300,028	19,756	69,308	69	89,133	2,062
1976	200,492	1,277,796	2,308	1,480,596	23,350	82,454	3,025	108,829	12,629
1977	209,744	1,492,868	1,987	1,704,599	38,539	94,668	5,065	138,272	12,914
1978[c]	223,019	1,807,504	2,157	2,032,680	28,961	110,626	7,843	147,430	24,654

Sources: CAB (b), Dec. 1978 and (p), Dec. 1977

[a]Individual figures may not add up to totals because of rounding.

[b]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[c]Delta's North Atlantic international service inaugurated April 30, 1978

Table F.3

Revenues by Traffic Category -- Total System[a]
Air California, Air Florida, PSA and Southwest, 1975-78

Year	Revenues in U.S. Dollars (000)[b]							
	Scheduled Passenger			Scheduled Cargo			Charter	Total Traffic
	Coach	Excess Bag.	Total	Mail	Freight	Total	Total	
				A. Air California				
1975	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	36,480
1976	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	46,531
1977	53,125[c]	-[d]	53,125	0	818	818	565	54,508
1978	63,295[e]	-[d]	63,295	0	963	963	1,806	66,064
				B. Air Florida				
1975[f]	2,542	79	2,621	0	9	9	62	2,692
1976[g]	2,152	25	2,177	0	9	9	262[h]	2,448
1977[g]	4,069	0	4,069	0	18	18	448[h]	4,535
1978[g]	13,812	8	13,819	0	109	109	1,425[h]	15,353
				C. PSA				
1975	124,270	87	124,357	237	1,934	2,171	145	126,673
1976	144,208	53	144,261	261	2,858	3,120	165	147,545
1977	163,426	48	163,474	312	3,234	3,546	1,020	168,040
1978	198,123	64	198,187	936	3,989	4,925	1,039	204,150
				D. Southwest				
1975	21,670	-[d]	21,670	0	757	757	58	22,485
1976	29,515	-[d]	29,515	0	864	864	123	30,503
1977	46,961	-[d]	46,961	0	1,318	1,318	169	48,449
1978	77,584	-[d]	77,584	0	2,364	2,364	200	80,148

Sources: Air California (c), Appendix A, (d) and (e); Air Florida (o), June 30, 1975; Peat, Marwick, Mitchell & Co., "1977" and "1978"; PSA (h), (j) and (l); Southwest (d) and (h), Dec. 1978, Schedule C.1

[a]Domestic except for Air Florida's charter service

[b]Individual figures may not add up to totals because of rounding.

[c]$30(000) added to coach revenues to account for a small difference between detailed Air California revenue data filed with the California Public Utilities Commission and total revenue data reported in its statement of earnings

[d]Included in passenger revenues

[e]Actual total traffic revenues allocated among categories on the basis of Air California's actual revenues for the first ten months of 1978

[f]Fiscal year ended July 31, 1975. Partially estimated from actual data for the 11 months ended June 30, 1975 plus estimated data for July 1975

[g]Fiscal year ended July 31

[h]International charter revenues comprised at least 83 per cent of Air Florida's total charter revenues in fiscal 1976, 91 per cent in fiscal 1977 and 80 per cent in fiscal 1978.

Table F.4

Revenues by Traffic Category and Area of Operation
Eastern Provincial, Nordair, Pacific Western,
Quebecair and Transair, 1975-78

Year	Eastern Provincial's Revenues in Dollars (000)[a]								
	Scheduled Passenger			Scheduled Cargo				Charter	Total Traffic
	Economy	Excess Bag.	Total	Mail	Frgt.	Exp.	Total	Total	
				A. Domestic					
1975	24,754	129	24,884	1,291	2,557	15	3,862	117	28,863
1976[b]	25,613	176	25,789	1,860	2,488	59	4,408	147	30,343
1977[b]	32,130	177	32,308	2,007	2,522	98	4,627	573	37,507
1978	38,928	183	39,111	2,364	3,244	306	5,914	667	45,692
				B. Transborder					
1975	228 [c]	0	228	0	0	0	0	3,792	4,020
1976[b]	393 [c]	0	393	0	0	0	0	3,889	4,282
1977[b]	448 [c]	0	448	0	0	0	0	3,412	3,859
1978	480 [c]	0	480	0	0	0	0	3,759	4,239
				C. North America (A+B)					
1975	24,983	129	25,112	1,291	2,557	15	3,862	3,909	32,883
1976[b]	26,006	176	26,182	1,860	2,488	59	4,408	4,036	34,625
1977[b]	32,578	177	32,755	2,007	2,522	98	4,627	3,984	41,366
1978	39,408	183	39,591	2,364	3,244	306	5,914	4,426	49,931
				D. International					
1975	0	0	0	0	0	0	0	0	0
1976[b]	0	0	0	0	0	0	0	0	0
1977[b]	0	0	0	0	0	0	0	125	125
1978	0	0	0	0	0	0	0	0	0
				E. Total System					
1975	24,983	129	25,112	1,291	2,557	15	3,862	3,909	32,883
1976[b]	26,006	176	26,182	1,860	2,488	59	4,408	4,036	34,625
1977[b]	32,578	177	32,755	2,007	2,522	98	4,627	4,109	41,491
1978	39,408	183	39,591	2,364	3,244	306	5,914	4,426	49,931

(cont.)

Table F.4 (continued)

Year	Nordair's Revenues in Dollars (000)[a]								
	Scheduled Passenger			Scheduled Cargo				Charter	Total Traffic
	Economy	Excess Bag.	Total	Mail	Frgt.	Exp.	Total	Total	
				A. Domestic					
1975	13,538	307	13,845	1,408	5,649	0	7,057	3,387	24,289
1976[b]	15,776	318	16,095	2,143	6,907	0	9,050	2,666	27,811
1977[b]	18,381	318	18,698	2,151	7,941	0	10,092	2,874	31,664
1978[b]	20,848	309	21,157	2,176	8,327	0	10,503	3,552	35,211
				B. Transborder					
1975	1,090[d]	1[d]	1,090[d]	2[d]	53[d]	0	56[d]	3,881	5,027
1976[b]	1,174[d]	1[d]	1,175[d]	4[d]	71[d]	0	75[d]	4,866	6,117
1977[b]	1,382[d]	1[d]	1,383[d]	6[d]	89[d]	0	95[d]	7,589	9,067
1978[b]	1,720[d]	1[d]	1,721[d]	6[d]	102[d]	0	108[d]	7,018	8,847
				C. North America (A+B)					
1975	14,628	307	14,935	1,411	5,703	0	7,113	7,268	29,316
1976[b]	16,951	319	17,270	2,147	6,978	0	9,126	7,532	33,928
1977[b]	19,763	319	20,082	2,157	8,030	0	10,187	10,463	40,732
1978[b]	22,567	310	22,878	2,182	8,429	0	10,611	10,570	44,058
				D. International					
1975	0	0	0	0	0	0	0	8,622	8,622
1976[b]	0	0	0	0	0	0	0	13,272	13,272
1977[b]	0	0	0	0	0	0	0	14,489	14,489
1978[b]	0	0	0	0	0	0	0	16,167	16,167
				E. Total System					
1975	14,628	307	14,935	1,411	5,703	0	7,113	15,890	37,938
1976[b]	16,951	319	17,270	2,147	6,978	0	9,126	20,805	47,200
1977[b]	19,763	319	20,082	2,157	8,030	0	10,187	24,951	55,220
1978[b]	22,567	310	22,878	2,182	8,429	0	10,611	26,736	60,225

Table F.4 (continued)

Year	Nordair's Revenues in Dollars (000)[a]								
	Scheduled Passenger			Scheduled Cargo				Charter	Total Traffic
	Economy	Excess Bag.	Total	Mail	Frgt.	Exp.	Total	Total	
				A. Domestic					
1975	13,538	307	13,845	1,408	5,649	0	7,057	3,387	24,289
1976[b]	15,776	318	16,095	2,143	6,907	0	9,050	2,666	27,811
1977[b]	18,381	318	18,698	2,151	7,941	0	10,092	2,874	31,664
1978[b]	20,848	309	21,157	2,176	8,327	0	10,503	3,552	35,211
				B. Transborder					
1975	1,090[d]	1[d]	1,090[d]	2[d]	53[d]	0	56[d]	3,881	5,027
1976[b]	1,174[d]	1[d]	1,175[d]	4[d]	71[d]	0	75[d]	4,866	6,117
1977[b]	1,382[d]	1[d]	1,383[d]	6[d]	89[d]	0	95[d]	7,589	9,067
1978[b]	1,720[d]	1[d]	1,721[d]	6[d]	102[d]	0	108[d]	7,018	8,847
				C. North America (A+B)					
1975	14,628	307	14,935	1,411	5,703	0	7,113	7,268	29,316
1976[b]	16,951	319	17,270	2,147	6,978	0	9,126	7,532	33,928
1977[b]	19,763	319	20,082	2,157	8,030	0	10,187	10,463	40,732
1978[b]	22,567	310	22,878	2,182	8,429	0	10,611	10,570	44,058
				D. International					
1975	0	0	0	0	0	0	0	8,622	8,622
1976[b]	0	0	0	0	0	0	0	13,272	13,272
1977[b]	0	0	0	0	0	0	0	14,489	14,489
1978[b]	0	0	0	0	0	0	0	16,167	16,167
				E. Total System					
1975	14,628	307	14,935	1,411	5,703	0	7,113	15,890	37,938
1976[b]	16,951	319	17,270	2,147	6,978	0	9,126	20,805	47,200
1977[b]	19,763	319	20,082	2,157	8,030	0	10,187	24,951	55,220
1978[b]	22,567	310	22,878	2,182	8,429	0	10,611	26,736	60,225

(cont.)

Table F.4 (continued)

Year	Quebecair's Revenues in Dollars (000)[a]								
	Scheduled Passenger			Scheduled Cargo				Charter	Total Traffic
	Economy	Excess Bag.	Total	Mail	Frgt.	Exp.	Total	Total	
				A. Domestic					
1975	21,828	283	22,110	613	2,602	0	3,215	1,630	26,956
1976[b]	24,310	338	24,648	798	2,322	0	3,120	3,408	31,176
1977[b]	27,860	346	28,206	952	2,284	0	3,236	11,315	42,757
1978[b]	29,645	383	30,028	898	2,508	0	3,407	17,092	50,526
				B. Transborder					
1975	0	0	0	0	0	0	0	2,964	2,964
1976[b]	0	0	0	0	0	0	0	2,064	2,064
1977[b]	0	0	0	0	0	0	0	2,856	2,856
1978[b]	0	0	0	0	0	0	0	3,541	3,541
				C. North America (A+B)					
1975	21,828	283	22,110	613	2,602	0	3,215	4,594	29,920
1976[b]	24,310	338	24,648	798	2,322	0	3,120	5,472	33,241
1977[b]	27,860	346	28,206	952	2,284	0	3,236	14,171	45,613
1978[b]	29,645	383	30,028	898	2,508	0	3,407	20,633	54,067
				D. International					
1975	0	0	0	0	0	0	0	13,254	13,254
1976[b]	0	0	0	0	0	0	0	11,684	11,684
1977[b]	0	0	0	0	0	0	0	17,415	17,415
1978[b]	0	0	0	0	0	0	0	19,259	19,259
				E. Total System					
1975	21,828	283	22,110	613	2,602	0	3,215	17,849	43,174
1976[b]	24,310	338	24,648	798	2,322	0	3,120	17,156	44,925
1977[b]	27,860	346	28,206	952	2,284	0	3,236	31,586	63,028
1978[b]	29,645	383	30,028	898	2,508	0	3,407	39,892	73,327

Table F.4 (continued)

Year	Transair's Revenues in Dollars (000)[a]								
	Scheduled Passenger			Scheduled Cargo				Charter	Total Traffic
	Economy	Excess Bag.	Total	Mail	Frgt.	Exp.	Total	Total	
				A. Domestic					
1975[b]	17,819	109	17,928	441	1,417	371	2,229	1,404	21,561
1976[b]	21,215	101	21,316	643	1,887	398	2,927	1,743	25,986
1977[b]	25,473	104	25,577	774	2,241	436	3,450	1,895	30,922
1978	28,628	89	28,717	788	2,448	312	3,547	2,218	34,483
				B. Transborder					
1975[b]	0	0	0	0	0	0	0	2,047	2,047
1976[b]	0	0	0	0	0	0	0	2,574	2,574
1977[b]	0	0	0	0	0	0	0	3,136	3,136
1978	0	0	0	0	0	0	0	4,180	4,180
				C. North America (A+B)					
1975[b]	17,819	109	17,928	441	1,417	371	2,229	3,451	23,608
1976[b]	21,215	101	21,316	643	1,887	398	2,927	4,318	28,561
1977[b]	25,473	104	25,577	774	2,241	436	3,450	5,031	34,058
1978	28,628	89	28,717	788	2,448	312	3,547	6,398	38,663
				D. International					
1975[b]	0	0	0	0	0	0	0	4,102	4,102
1976[b]	0	0	0	0	0	0	0	5,566	5,566
1977[b]	0	0	0	0	0	0	0	3,064	3,064
1978	0	0	0	0	0	0	0	3,260	3,260
				E. Total System					
1975[b]	17,819	109	17,928	441	1,417	371	2,229	7,553	27,710
1976[b]	21,215	101	21,316	643	1,887	398	2,927	9,884	34,127
1977[b]	25,473	104	25,577	774	2,241	436	3,450	8,095	37,122
1978	28,628	89	28,717	788	2,448	312	3,547	9,659	41,923

Sources: Same as Table F.1; Nordair (a), Appendix 10

[a]Individual figures may not add up to totals because of rounding.

[b]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[c]St. Pierre and Miquelon

[d]Partially estimated. On-line origin/destination passenger data for 1975 for Hamilton/Montreal/Ottawa-Pittsburgh (27,243) times the Hamilton-Pittsburgh yield ($40.03) equals 20.9 per cent of total passenger revenues for the southern route. This percentage was applied to total southern route passenger and cargo revenues for 1975-78 to obtain estimates for transborder revenues.

[e]Less than $500

Table F.5

Revenues by Traffic Category -- Total System[a]
Allegheny, Frontier, North Central and Southern, 1975-78

Year	Revenues in U.S. Dollars (000)[b]								
	Scheduled Passenger			Scheduled Cargo				Charter	Total Traffic
	First-Class[c]	Exc. Bag.	Total	Mail	Freight	Exp.	Total	Total	
				A. Allegheny					
1975	341,018	353	341,371	5,542	15,372	1,052	21,966	1,593	364,930
1976	393,241	358	393,599	6,503	21,476	503	28,482	6,093	428,174
1977	439,093	372	439,465	16,905	23,442	748	41,095	6,214	486,774
1978	501,695	513	502,208	10,297	26,739	1,206	38,242	8,591	549,041
				B. Frontier					
1975	142,253	183	142,436	1,852	6,499	182	8,533	12	150,981
1976	173,126	230	173,356	2,291	8,854	73	11,218	22	184,596
1977	202,663	259	202,922	4,247	10,589	163	15,009	26	217,957
1978	251,248	315	251,563	3,396	13,409	308	17,113	137	268,813
				C. North Central					
1975	134,185	155	134,340	1,996	8,025	351	10,372	2,839	147,551
1976	157,159	169	157,328	2,347	10,960	72	13,379	4,158	174,865
1977	186,641	168	186,809	4,932	13,345	166	18,443	6,185	211,437
1978	248,596	315	248,911	3,983	18,065	419	22,467	9,864	281,242
				D. Southern					
1975	94,154	121	94,275	1,049	4,260	42	5,351	8,208	107,834
1976	114,600	129	114,729	1,252	5,489	107	6,848	8,801	130,378
1977	130,179	142	130,321	2,689	6,470	166	9,325	9,594	149,240
1978	159,034	154	159,188	1,710	8,237	234	10,181	7,162	176,531

Sources: CAB (b), Dec. 1978 and (p), Dec. 1977

[a]North America except for Southern's international route to the Cayman Islands and perhaps some charter flights

[b]Individual figures may not add up to totals because of rounding.

[c]The CAB classifies traffic on the basis of fares. Since these local service carriers all charged standard or premium fares during these years, their passenger traffic (and revenues) have been classified as first-class even though the quality of their service (seat densities, meals, liquor charges, etc.) was equivalent to the coach/economy service of the U.S. trunk and the Canadian carriers.

Appendix G

SCHEDULED REVENUE PASSENGER-MILES BY AREA OF OPERATION, 1969-78

Table G.1

Scheduled Revenue Passenger-Miles by Area of Operation
Air Canada and CP Air, 1969-78

Year	Scheduled Revenue Passenger-Miles (000)[a]					
	Air Canada			CP Air		
	1st Class	Economy	Total	1st Class	Economy	Total
			A. Domestic			
1969	n.a.	n.a.	n.a.	42,511	623,063	665,574
1970	n.a.	n.a.	n.a.	65,470	721,802	787,271
1971	n.a.	n.a.	n.a.	65,601	738,579	804,180
1972	n.a.	n.a.	4,246,366[b,c]	73,367	863,427	936,794[c]
1973	n.a.	n.a.	5,440,939[b,c]	78,139	920,672	998,811[c]
1974	n.a.	n.a.	5,802,501[b]	110,553	1,350,011	1,460,564[c]
1975	283,755	5,562,352	5,846,107	114,303	1,530,683	1,644,986
1976	261,449	5,655,817	5,917,265[c]	103,928	1,505,830	1,609,758[c]
1977	179,194	5,835,812	6,015,006[c]	74,161	1,497,870	1,572,031[c]
1978	156,926	6,242,765	6,399,691[c]	61,715	1,735,257	1,796,972
			B. Transborder			
1969	n.a.	n.a.	n.a.	7,351	74,495	81,846[d]
1970	n.a.	n.a.	n.a	19,808	318,470	338,278
1971	n.a.	n.a.	n.a.	19,838	348,124	367,962
1972	n.a.	n.a.	1,111,050[b,c]	21,205	355,961	377,166[c]
1973	n.a.	n.a.	1,317,604[b,c]	19,932	349,514	369,447[c]
1974	n.a.	n.a.	1,458,321[b,c]	27,997	490,601	518,577[c]
1975	104,291	1,433,526	1,537,817	40,105	667,080	707,185
1976	111,645	1,715,271	1,826,916[c]	41,515	703,073	744,589[c]
1977	92,414	1,816,725	1,909,139[c]	27,413	700,798	728,212[c]
1978	95,267	2,000,456	2,095,722	19,722	749,045	768,767
			C. North America (A+B)			
1969	349,596	3,948,809	4,298,406[c]	49,862	697,558	747,420[d]
1970	363,435	4,390,636	4,754,070	85,277	1,040,272	1,125,549
1971	336,684	4,325,431	4,662,115	85,439	1,086,703	1,172,142
1972	416,346	4,941,205	5,357,551[b,c]	94,572	1,219,388	1,313,960[c]
1973	530,592	6,228,097	6,758,689[b,c]	98,071	1,270,186	1,368,258[c]
1974	492,377	6,768,581	7,260,957[b,c]	138,530	1,840,612	1,979,142[c]
1975	388,046	6,995,878	7,383,924	154,407	2,197,763	2,352,170
1976	373,094	7,371,088	7,744,182[c]	145,443	2,208,903	2,354,346[c]
1977	271,608	7,652,537	7,924,145[c]	101,574	2,198,669	2,300,243[c]
1978	252,193	8,243,220	8,495,413[c]	81,437	2,484,301	2,565,739

Table G.1 (continued)

Year	Scheduled Revenue Passenger-Miles (000)[a]					
	Air Canada			CP Air		
	1st Class	Economy	Total	1st Class	Economy	Total
			D. International			
1969	70,475	1,371,418	1,441,893[c]	52,686	1,184,551	1,237,237[d]
1970	83,315	1,844,325	1,927,640	42,770	1,200,986	1,243,756
1971	79,200	1,685,515	1,764,714	41,210	1,196,725	1,237,935
1972	81,176	2,462,651	2,543,827[c]	41,966	1,395,618	1,437,583[c]
1973	98,020	2,744,263	2,842,283[c]	41,262	1,481,332	1,522,594[c]
1974	93,354	2,913,777	3,007,130[c]	59,609	1,874,660	1,934,268[c]
1975	83,409	2,642,744	2,726,152	59,320	1,839,569	1,898,889
1976	92,076	2,868,782	2,960,857[c]	49,675	1,803,681	1,853,355[c]
1977	95,498	3,277,048	3,372,546[c]	41,989	1,977,318	2,019,308[c]
1978	80,037	3,441,846	3,521,883[c]	41,448	2,133,457	2,174,905
			E. Total System			
1969	420,071	5,320,227	5,740,299[c]	102,548	1,882,109	1,984,656
1970	446,749	6,234,961	6,681,710	128,048	2,241,258	2,369,305
1971	415,884	6,010,946	6,426,830	126,648	2,283,429	2,410,077
1972	497,522	7,403,856	7,901,378[c]	136,538	2,615,005	2,751,543[c]
1973	628,612	8,972,360	9,600,972[c]	139,333	2,751,518	2,890,851[c]
1974	585,730	9,682,357	10,268,087[c]	198,138	3,715,272	3,913,410[c]
1975	471,455	9,638,621	10,110,076	213,728	4,037,332	4,251,060
1976	465,170	10,239,869	10,705,039[c]	195,118	4,012,584	4,207,702[c]
1977	367,106	10,929,585	11,296,691[c]	143,564	4,175,987	4,319,551[c]
1978	332,230	11,685,067	12,017,297[c]	122,885	4,617,758	4,740,643

Sources: CTC(A) and SC(ASC), 1969-78; SC(ASC) (s)

[a]Individual figures may not add up to totals because of rounding.

[b]The sum of Domestic and Transborder RPM differ slightly from the total for North America since data were obtained from different sources.

[c]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[d]Canada-Hawaii (Transborder/North America) RPM reported as part of Canada-South Pacific (International) in 1969. Canada-Hawaii total RPM = 239,379(000) in 1970.

Table G.2

Scheduled Revenue Passenger-Miles by Area of Operation
Trans World, Northwest and Delta, 1969-78

Year	Scheduled Revenue Passenger-Miles (000)[a]								
	Trans World			Northwest			Delta		
	1st Class	Coach	Total	1st Class	Coach	Total	1st Class	Coach	Total
				A. North America					
1969	2,192,096	10,437,989	12,630,085	596,840	4,600,132	5,196,972	1,436,267	7,328,229	8,764,496
1970	2,003,301	10,392,593	12,395,894	422,154	2,992,604	3,414,758[b]	1,405,113	8,175,373	9,580,486
1971	1,736,294	10,778,305	12,514,599	460,048	3,924,864	4,384,912	1,303,589	8,702,986	10,006,575[c]
1972	1,734,934	11,845,934	13,580,868	385,424	3,272,400	3,657,824[b]	1,550,479	10,743,409	12,293,888[c]
1973	1,464,924	10,992,186	12,457,110[b]	582,147	5,344,297	5,926,444	1,741,485	13,280,563	15,022,048[c]
1974	1,565,921	12,271,169	13,837,090	650,346	6,129,484	6,779,830	2,282,393	13,379,232	15,661,625
1975	1,385,047	13,003,359	14,388,406	563,929	6,370,465	6,934,394[b]	1,909,460	14,146,942	16,056,402
1976	1,235,382	14,047,013	15,282,395	551,942	7,368,381	7,920,323	1,678,579	15,512,072	17,190,651
1977	1,180,936	14,931,635	16,112,571	540,305	7,627,705	8,168,010	1,584,115	17,071,316	18,655,431
1978	1,367,478	16,267,777	17,635,255	332,553	4,568,060	4,901,522[b]	1,764,991	20,635,756	22,400,747
				B. International					
1969	505,067	4,402,854	4,907,921	81,648	930,103	1,011,751	13,868	86,343	100,211
1970	568,495	5,634,697	6,203,192	74,701	1,016,793	1,091,494[b]	19,355	112,866	132,221
1971	514,881	6,270,804	6,785,685	83,793	1,084,332	1,168,125	n.a.	n.a.	n.a.[c]
1972	605,893	7,931,834	8,537,727	61,572	846,219	907,791[b]	n.a.	n.a.	n.a.[c]
1973	460,892	6,735,589	7,196,481[b]	137,890	1,943,516	2,081,406	n.a.	n.a.	n.a.[c]
1974	493,227	6,263,324	6,756,551	126,749	2,267,299	2,394,048	42,062	424,019	466,081
1975	497,172	6,071,329	6,568,501	97,497	2,439,389	2,536,886[b]	28,852	375,209	404,061
1976	511,212	6,501,733	7,012,945	84,994	2,753,365	2,838,359	26,171	406,611	432,782
1977	548,368	7,195,305	7,743,673	95,439	2,836,959	2,932,398	28,846	435,375	464,221
1978	564,756	8,767,342	9,332,098	91,184	2,025,599	2,116,783[b]	56,269	875,238	931,507[d]

Table G.2 (continued)

Year	Scheduled Revenue Passenger-Miles (000)[a]								
	Trans World			Northwest			Delta		
	1st Class	Coach	Total	1st Class	Coach	Total	1st Class	Coach	Total
				C. Total System					
1969	2,697,163	14,840,843	17,538,006	678,488	5,530,235	6,208,723	1,450,135	7,414,572	8,864,707
1970	2,571,796	16,027,290	18,599,086	496,855	4,009,397	4,506,252[b]	1,424,468	8,288,239	9,712,707
1971	2,251,175	17,049,109	19,300,284	543,841	5,009,196	5,553,037	1,303,589	8,702,986	10,006,575
1972	2,340,827	19,777,768	22,118,595	446,996	4,118,619	4,565,615[b]	1,550,479	10,743,409	12,293,888[c]
1973	1,970,033	18,470,663	20,440,696[b]	720,037	7,287,813	8,007,850	1,741,485	13,280,563	15,022,048
1974	2,100,906	19,118,893	21,215,799	777,095	8,396,783	9,173,878	2,324,455	13,803,251	16,127,706
1975	1,882,219	19,074,688	20,956,907	661,426	8,809,854	9,471,280[b]	1,938,312	14,522,151	16,460,463
1976	1,746,594	20,548,746	22,295,340	636,936	10,121,746	10,758,682	1,704,750	15,918,683	17,623,433
1977	1,729,304	22,126,940	23,856,244	635,744	10,464,664	11,100,408	1,612,961	17,506,691	19,119,652
1978	1,932,234	25,035,119	26,967,353	423,737	6,594,568	7,018,305[b]	1,821,260	21,510,994	23,332,254

Sources: CAB (c), Dec. 1978, (i) and (p), Nov. 1975 and Dec. 1977

[a]Individual figures may not add up to totals because of rounding.

[b]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[c]Delta was granted a waiver by the CAB to report international operations with domestic. In 1970, Delta's international RPM comprised 1.4 per cent of total system RPM. By 1974, this had increased to 3.0 per cent. Delta merged with Northeast Airlines effective August 1, 1972.

[d]Delta's North Atlantic international was inaugurated April 30, 1978.

Table G.3

Scheduled Revenue Passenger-Miles -- Total System[a]
Air California, Air Florida, PSA and Southwest, 1966-78

	Scheduled Revenue Passenger-Miles (000)					
				Southwest		
Year	Air California	Air Florida	PSA[b]	Executive	Pleasure	Total[c]
1966	-	-	834,175	-	-	-
1967	106,285[d,e]	-	1,030,299	-	-	-
1968	218,297	-	1,231,530	-	-	-
1969	299,843	-	1,370,205	-	-	-
1970	290,712	-	1,585,392	-	-	-
1971	320,410	-	1,740,769	26,661	-	26,661[f]
1972	386,809	n.a.	1,845,828	67,600[g]	5,500[g]	73,079
1973	460,871	n.a.	1,936,343[h]	47,100[g]	83,400[g,i]	130,533
1974	512,920	34,224[e]	1,996,010	85,400[g]	98,200[g,j]	183,596
1975	553,232	25,057[e]	2,024,414	167,100[g]	131,400[g]	298,458
1976	667,398	17,181	2,088,444	215,926	190,344	406,269
1977	759,430	84,068	2,327,229	343,744	331,925	675,668
1978	812,950	181,060	2,495,181	543,009	505,614	1,048,624

Sources: Air California (a), 1967, 1968, 1973, 1976 and information supplied by F.R. Davis (Vice President -- Marketing), Oct. 12, 1978 and M.P. Van Dordrecht (Vice President and Treasurer), July 18, 1979; Air Florida (b), 1974-78 and (m); Eichner, L.J. et al., 1976, p. III-91; PSA (c) and (f), Dec. 31, 1975 and 1978; Southwest (a), 1972 and 1975, (e), (f), (g), (i) and (k)

[a]Domestic intrastate

[b]Includes charter as well as scheduled RPM. During 1975-78, PSA produced the following estimated charter RPM per year (000): 2,400, 2,400, 14,400 and 13,000 (see note k, Table E.3).

[c]Individual figures may not add up to totals due to rounding.

[d]Air California inaugurated service on January 16, 1967.

[e]Estimated from O & D passenger data multiplied by airport-to-airport mileages

[f]Southwest inaugurated service on June 18, 1971.

[g]Estimated using passenger share and load factor percentages by class of service

[h]Service interrupted by a strike having a significant impact on operations (see Appendix D)

[i]All Dallas-San Antonio passengers were pleasure class from January 20 through December 31, 1973. Most Dallas-Houston passengers were pleasure class from February 5 through April 1, 1973, as a result of a price war.

[j]All Dallas-San Antonio passengers were pleasure class from January 1 through September 3, 1974.

Table G.4

Unit Toll and Total Revenue Passenger-Miles by Area of Operation
Eastern Provincial, Nordair, Pacific Western, Quebecair and Transair, 1975-78

Year	Revenue Passenger-Miles (000)									
	Eastern Provincial		Nordair		Pacific Western		Quebecair		Transair	
	Unit Toll	Total[a]	Unit Toll	Total[a]	Unit Toll	Total[a]	Unit Toll	Total[a]	Unit Toll	Total[a]
					A. Domestic					
1975	236,224	237,408	126,395	133,076[e]	460,690[f]	488,780	172,492	173,971	153,414	162,862[c]
1976	222,330	224,707[c]	136,632	145,764[c,e]	470,422	511,451[c]	175,656	181,043[c]	189,323	197,644[c]
1977	254,713	260,129[c]	146,409	159,636[c,e]	522,247	570,925[c]	185,412	220,373[c]	205,778	223,191[c]
1978	293,190	305,010	156,238	173,840[c,e]	537,854	611,027[c]	186,976	258,577[c]	229,201	254,736
					B. Transborder					
1975	1,551[b]	86,044	5,315[d]	99,523[e]	16,308[f]	116,554	0	74,179	0	37,451[c]
1976	2,177[b]	103,406[c]	5,553[d]	124,122[c,e]	13,474	168,299[c]	0	59,102[c]	0	62,476[c]
1977	2,441[b]	80,436[c]	5,442[d]	183,780[c,e]	19,877	213,583[c]	0	70,530[c]	0	70,516[c]
1978	2,515[b]	79,140	6,101[d]	159,607[c,e]	20,621	220,225[c]	0	84,610[c]	0	91,423
					C. North America (A+B)					
1975	237,775	323,452	131,710	232,599	476,998[f]	605,334	172,492	248,150	153,414	200,313[c]
1976	224,507	328,113[c]	142,185	269,886[c]	483,896	679,750[c]	175,656	240,145[c]	189,323	260,120[c]
1977	257,154	340,565[c]	151,851	343,416[c]	542,124	784,508[c]	185,412	290,903[c]	205,778	293,707[c]
1978	295,705	384,150	162,339	333,447[c]	558,475	831,253[c]	186,976	343,187[c]	229,201	346,159
					D. International					
1975	0	0	0	205,752	0	86,823	0	334,876	0	73,077[c]
1976	0	0[c]	0	334,626[c]	0	121,709[c]	0	289,905[c]	0	143,370[c]
1977	0	583[c]	0	355,894[c]	0	284,989[c]	0	417,978[c]	0	70,989[c]
1978	0	0	0	366,678[c]	0	266,207[c]	0	439,913[c]	0	71,908

(cont.)

Table G.4 (continued)

Year	Revenue Passenger-Miles (000)									
	Eastern Provincial		Nordair		Pacific Western		Quebecair		Transair	
	Unit Toll	Total[a]	Unit Toll	Total[a]	Unit Toll	Total[a]	Unit Toll	Total[a]	Unit Toll	Total[a]
					E. Total System					
1969	58,240	60,496	n.a.	93,858	168,067	395,484	71,381	77,277	55,712	72,281
1970	106,992	111,986	46,830	117,981	203,090	524,519	68,171	89,191	91,555	113,242
1971	143,369	145,840	59,594	195,633	256,880	461,133	87,833	127,751	119,597	138,481
1972	160,012	165,785[c]	67,818	264,635[c]	307,394	492,653[c]	97,464	151,055[c]	120,968	153,074[c]
1973	217,211	220,708	100,857	285,847[c]	398,478	618,422	125,226	191,403	150,858	221,907
1974	240,065	290,531[c]	124,585	371,944[c]	446,477	670,069[c]	137,956	247,958[c]	158,850	339,636[c]
1975	237,775	323,453	131,710	438,350	476,998[f]	692,158	172,492	583,025	153,414	273,390[c]
1976	224,507	328,114[c]	142,185	604,511[c]	483,896	801,458[f]	175,656	530,050[c]	189,323	403,490[c]
1977	257,154	341,149[c]	151,851	699,310[c]	542,124	1,069,496[f]	185,412	708,882[c]	205,778	364,696[c]
1978	295,705	384,150	162,339	700,126[c]	558,475	1,097,460[c]	186,976	783,101[c]	229,201	418,067

Sources: DBS, 1969; Nordair (b); SC(ASC) (s) and (u)

[a]All services, unit toll plus charter. Individual figures may not add up to totals due to rounding.

[b]St. Pierre and Miquelon

[c]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[d]Partially estimated. See note e, Table E.4.

[e]All southern-route charter RPM were assumed to be transborder, leaving the northern route as domestic.

[f]PWA operated only class 1 and 8 unit-toll service in 1975 and subsequent years.

Table G.5

Scheduled and Nonscheduled Revenue Passenger-Miles -- Total System[a]
Allegheny, Frontier, North Central and Southern, 1969-78

Year	Revenue Passenger-Miles (000)			
	Allegheny	Frontier	North Central	Southern
		A. Scheduled		
1969	1,320,991	919,654	600,380	323,472
1970	1,682,840	1,022,710	778,375[c]	430,736
1971	1,884,529	1,039,998	818,689	527,550
1972	2,764,241[b]	1,099,508	976,513[c]	596,197
1973	3,290,862	1,308,123	955,840	721,135
1974	3,404,639	1,389,241	1,016,103	832,372
1975	3,272,212	1,455,299	1,029,154	852,547
1976	3,496,906	1,679,909	1,108,809	978,991
1977	3,642,868	1,887,449	1,281,075	1,044,818
1978	4,083,420	2,377,931	1,714,134[c]	1,334,987
		B. Charter		
1969	558	68,489	9,594	54,006
1970	3,482	51,844	27,788[c]	67,614
1971	10,509	26,194	47,045	75,880
1972	6,906[b]	2,452	52,677[c]	85,240
1973	11,142	752	55,685	93,445
1974	10,272	117	44,759	108,173
1975	32,278	217	42,487	130,212
1976	112,890	254	70,336	145,971
1977	104,515	326	111,330	146,570
1978	160,005	3,585	211,316[c]	103,694
		C. Total		
1969	1,321,549	988,143	609,974	377,478
1970	1,686,322	1,074,554	806,163[c]	498,350
1971	1,895,038	1,066,192	865,734	603,430
1972	2,771,147[b]	1,101,960	1,029,190[c]	681,437
1973	3,302,004	1,308,875	1,011,525	814,580
1974	3,414,911	1,389,358	1,060,862	940,545
1975	3,304,490	1,455,516	1,071,641	982,759
1976	3,609,796	1,680,163	1,179,145	1,124,962
1977	3,747,383	1,887,775	1,392,405	1,191,388
1978	4,243,425	2,381,516	1,925,450[c]	1,438,681

Sources: CAB (c), Dec. 1978, (i) and (p), Nov. 1975 and Dec. 1977

[a]North America except for Southern's international route to the Cayman Islands and perhaps some charter flights

[b]Allegheny merged with Mohawk on April 12, 1972.

[c]North Central benefited from an extended strike at Northwest (see Appendix D).

Appendix H

REVENUE PASSENGERS BY TRAFFIC CATEGORY AND AREA
OF OPERATION, 1975-78

Table H.1

Revenue Passengers by Traffic Category and Area of Operation
Air Canada and CP Air, 1975-78

Year	Number of Revenue Passengers (000)							
	Air Canada[a]			CP Air[b]				
	Scheduled[c]	Charter	Total[d]	First-Class	Economy	Scheduled[d]	Charter	Total[d]
				A. Domestic				
1975	7,558	6	7,565	93	1,496	1,588	4	1,592
1976	7,424	15	7,439[e]	77	1,482	1,558	4	1,563[e]
1977	7,514	33	7,547[e]	53	1,515	1,568	8	1,576[e]
1978	7,608	12	7,620[e]	43	1,790	1,833	18	1,851
				B. Transborder				
1975	1,933	10	1,944	30	397	427	6	433
1976	2,123	25	2,148[e]	27	437	465	31	496[e]
1977	2,150	39	2,189[e]	15	400	415	29	444[e]
1978	2,280	65	2,345[e]	13	418	431	21	452
				C. North America (A+B)				
1975	9,491	17	9,508	123	1,893	2,016	10	2,026
1976	9,547	40	9,587[e]	104	1,920	2,023	36	2,059[e]
1977	9,664	72	9,736[e]	68	1,915	1,983	38	2,020[e]
1978	9,888	77	9,965[e]	56	2,208	2,264	39	2,303
				D. International				
1975	903	277	1,179	15	487	503	43	546
1976	963	196	1,159[e]	10	428	437	81	518[e]
1977	1,112	98	1,211[e]	9	470	478	145	624[e]
1978	1,141	149	1,290[e]	8	502	511	165	676
				E. Total System				
1975	10,394	294	10,688	138	2,380	2,518	54	2,572
1976	10,510	236	10,746[e]	113	2,347	2,461	117	2,577[e]
1977	10,776	170	10,946[e]	76	2,385	2,461	183	2,644[e]
1978	11,029	226	11,255[e]	64	2,710	2,775	204	2,979

Sources: SC(ASC) (i) and (s)

[a]The precise basis on which Air Canada counts passengers is not known to Statistics Canada. It is believed that passengers are counted by area of operation; that is, passengers traveling domestically are counted only once regardless of how often they change planes, while those traveling both domestically and internationally (or transborder) are counted twice. If correct, this would approximate passenger originations by area of operation.

[b]CP Air counts its passengers whenever they change routes. Thus, a passenger flying on CP Air's transcontinental route and then on its northern route would be counted as two domestic passengers. Similarly, a passenger traveling on CP Air's transcontinental route and then on an international or transborder route would also be counted twice. If passengers generally change planes at route junction points, this way of counting would approximate passenger enplanements by area of operation.

[c]Breakdown between first-class and economy is not available.

[d]Individual figures may not add up to totals because of rounding.

[e]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

Table H.2

Revenue Passengers by Traffic Category and Area of Operation
Trans World, Northwest and Delta, 1975-78

Year	Number of Revenue Passengers (000)[a]								
	Trans World			Northwest			Delta		
	Scheduled[b]	Charter	Total	Scheduled[b]	Charter	Total	Scheduled[b]	Charter	Total
				A. North America					
1975	13,849	278	14,127	7,982	71	8,053[c]	26,149	25	26,174
1976	14,759	498	15,257	8,802	99	8,901	27,773	161	27,934
1977	15,505	434	15,999	9,337	89	9,426	30,159	168	30,327
1978	17,064	199	17,263	5,873	50	5,923[c]	35,706	266	35,972
				B. International					
1975	1,907	243	2,150	883	75	957[c]	353	3	356
1976	2,007	222	2,229	1,016	72	1,088	373	25	398
1977	2,211	279	2,490	1,018	69	1,087	394	12	406
1978	2,662	227	2,889	702	14	716[c]	550	64	614
				C. Total System					
1975	15,756	521	16,277	8,865	146	9,011[c]	26,502	28	26,530
1976	16,766	720	17,486	9,818	171	9,989	28,146	186	28,332
1977	17,776	713	18,489	10,355	158	10,513	30,553	180	30,733
1978	19,726	426	20,152	6,575	64	6,639[c]	36,256	330	36,586

Sources: CAB (c), Dec. 1978, (i) and (p), Dec. 1977

[a]The count of the number of passengers boarding aircraft. In 1969, revenue passenger enplanements exceeded revenue passenger originations (on each carrier's system) by 8.9 per cent for all domestic trunk carriers and 3.8 per cent for international and territorial operations.

[b]Breakdown between first-class and coach/economy is not available.

[c]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

Table H.3

Revenue Passengers by Traffic Category -- Total System[a]
Air California, Air Florida, PSA and Southwest, 1975-78

Year	Number of Revenue Passengers (000) Air California[b]	Air Florida[c]	PSA[c]	Southwest[c]
		A. Scheduled[d]		
1975	1,584	122	6,434[g]	1,136
1976	1,945	83	6,588[g]	1,539
1977	2,233	321	7,214[g]	2,340
1978	2,431	623	7,781[g]	3,528
		B. Charter		
1975	n.a.[e]	-	2[h]	n.a.
1976	n.a.	n.a.	3[h]	n.a.
1977	n.a.	n.a.	20[h]	n.a.
1978	n.a.	88[f]	21[h]	n.a.
		C. Total		
1975	n.a.	122	6,436	n.a.
1976	n.a.	n.a.	6,591	n.a.
1977	n.a.	n.a.	7,234	n.a.
1978	n.a.	711	7,802	n.a.

Sources: Air Florida (k) and telephone conversation with V. Binder, March 4, 1980; PSA (f), 1979, p. 4 and (h); PUC (b); Southwest (h), Schedule F

[a]North America, except for Air Florida's charter service (see Table F.3, note h)

[b]The count of the number of passengers boarding aircraft (based on ticket coupons). This is equivalent to passenger enplanements.

[c]The count of the number of passengers originating on the carrier's system. This is definitionally somewhat lower than passenger enplanements where a passenger is counted whenever he boards an aircraft. Due to the short-haul nature of the intrastate carriers' operations, however, differences between passenger originations and enplanements are appreciably less than the 8.9 and 6.0 per cent differences for the U.S. trunk and local service carriers (see Tables H.2 and H.4, notes a and b, respectively).

[d]All coach/economy passengers

[e]Air California operates only single-entity charters and limits its record keeping to charter revenues since the traffic carried is the charterer's responsibility.

[f]Estimated from charter revenue and rate data for January-May 1978, plus actual charter passenger data for August-December 1978

[g]The PUC Report No. 1525 submitted by PSA stated that San Diego-Lake Tahoe passengers connecting at Burbank, Los Angeles or San Francisco were counted on each flight. Therefore, the count of these passengers was equivalent to passenger enplanements. The following number of San Diego-Lake Tahoe passengers (in thousands) were treated in this manner:
1975 = 4, 1976 = 21, 1977 = 23 and 1978 = 27.

[h]Total passengers minus scheduled passenger originations

Table H.4

Revenue Passengers by Traffic Category and Area of Operation
Eastern Provincial, Nordair, Pacific Western, Quebecair and Transair, 1975-78

Year	Number of Revenue Passengers (000)								
	Eastern Provincial[a]			Nordair[b]			Pacific Western[b]		
	Sched.[c]	Charter	Total[d]	Sched.[c]	Charter	Total[d]	Sched.[c]	Charter	Total[d]
				A. Domestic					
1975	602	2	605	242	12	254	1,910	28	1,938
1976	600	3	603[h]	259	12	272[h]	1,920	39	1,959[h]
1977	719[e]	10	729[h]	271	15	287[h]	2,135	50	2,185[h]
1978	860	14	874	307	24	331[h]	2,282	58	2,340[h]
				B. Transborder					
1975	8[f]	60	68	27	77	104	132	46	177
1976	11[f]	77	89[h]	28	99	127[h]	110	81	192[h]
1977	12[f]	57	69[h]	30	134	164[h]	168	104	272[h]
1978	13[f]	53	66	36	113	149[h]	170	111	281[h]
				C. North America (A+B)					
1975	611	62	673	269	88	358	2,041	74	2,115
1976	611	81	692[h]	288	112	399[h]	2,030	120	2,151[h]
1977	732	66	798[h]	301	149	450[h]	2,303	155	2,457[h]
1978	873	67	940	343	137	480[h]	2,452	169	2,621[h]
				D. International					
1975	-	0	0	-	126	126	-	27	27
1976	-	0	0	-	163	163[h]	-	34	34[h]
1977	-	-[g]	-[g]	-	155	155[h]	-	77	77[h]
1978	-	0	0	-	160	160[h]	-	82	82[h]
				E. Total System					
1975	611	62	673	269	214	483	2,041	101	2,142
1976	611	81	692[h]	288	274	562[h]	2,030	154	2,184[h]
1977	732	67	799[h]	301	304	605[h]	2,303	231	2,534[h]
1978	873	67	940	343	297	641[h]	2,452	251	2,703[h]

(cont.)

Table H.4 (continued)

Year	Number of Revenue Passengers (000)					
	Quebecair[a]			Transair[a]		
	Sched.[c]	Charter	Total[d]	Sched.[c]	Charter	Total[d]
			A. Domestic			
1975	577	4	581	349	18	366[h]
1976	582	11	593[h]	387	16	403[h]
1977	577	30	607[h]	408	13	421[h]
1978	599	108	706[h]	433	25	459
			B. Transborder			
1975	-	45	45	-	32	32[h]
1976	-	42	42[h]	-	48	48[h]
1977	-	52	52[h]	-	58	58[h]
1978	-	57	57[h]	-	77	77
			C. North America (A+B)			
1975	577	49	626	349	50	398[h]
1976	582	53	635[h]	387	64	451[h]
1977	577	82	659[h]	408	72	479[h]
1978	599	165	763[h]	433	103	536
			D. International			
1975	-	156	156	-	34	34[h]
1976	-	135	135[h]	-	63	63[h]
1977	-	196	196[h]	-	42	42[h]
1978	-	208	208[h]	-	60	60
			E. Total System			
1975	577	205	782	349	84	433[h]
1976	582	188	770[h]	387	127	514[h]
1977	577	278	855[h]	408	113	521[h]
1978	599	373	972[h]	433	163	596

Table H.4 (continued)

Sources: Same as Table H.1 plus Nordair (a), Appendix 10 with supplemental notes; SC(ASC) (u), Dec. 1977, p. 10 and telephone conversation with G. Baldwin, March 5, 1980

[a]The precise basis on which the regional carriers count passengers is not known to Statistics Canada. It is believed that passengers are counted whenever they change routes on a carrier's system. Thus, a passenger traveling on two domestic routes, or on a domestic and then on a transborder route, would be counted twice. If correct, and if passengers generally change planes at route junction points, this way of counting would approximate passenger enplanements by area of operation.

[b]The precise basis on which Nordair counts passengers is not known to Statistics Canada. It is believed that passengers are counted whenever they originate on either of its two major routes (northern or southern). Thus, a passenger traveling on both routes would be counted twice. Since the southern route includes the Hamilton-Pittsburgh transborder segment, it was necessary to segregate transborder from domestic passengers on this route. This was done by using on-line origin/destination passenger data for 1975 and 1976 to calculate Hamilton/Montreal/Ottawa-Pittsburgh passenger originations, and 1977-78 data were estimated from 1975-76 percentages. These numbers were reported as transborder. In addition, the following Montreal/Ottawa-Pittsburgh passengers were also counted as domestic passengers since they utilized domestic services as well as transborder and their RPM were included in domestic operations:

1975 = 16,669, 1976 = 17,378, 1977 = 18,297, 1978 = 22,154.

[c]All economy passengers

[d]Individual figures may not add up to totals because of rounding.

[e]Eastern Provincial changed the route structure used in reporting scheduled statistics in April 1977. The net effect was an increase in the number of routes classified as scheduled and therefore an increase in the number of passengers.

[f]St. Pierre and Miquelon

[g]Less than 500

[h]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

Table H.5

Revenue Passengers by Traffic Category and Area of Operation[a]
Allegheny, Frontier, North Central and Southern, 1975-78

Year	Number of Revenue Passenger Enplanements (000)[b]			
	Allegheny	Frontier	North Central	Southern
		A. Scheduled[c]		
1975	10,269	3,733	4,530	2,935
1976	11,031	4,252	4,895	3,245
1977	11,653	4,711	5,438	3,457
1978	12,838	5,531	6,732[e]	4,111
		B. Charter		
1975	28	-[d]	50	169
1976	109	-[d]	74	182
1977	99	1	109	176
1978	126	3	179[e]	121
		C. Total		
1975	10,297	3,733	4,580	3,104
1976	11,140	4,252	4,969	3,427
1977	11,752	4,712	5,547	3,633
1978	12,964	5,534	6,911[e]	4,232

Sources: Same as Table H.2

[a]North America, except for Southern's international route to the Cayman Islands and perhaps some charter flights

[b]The count of the total number of passengers boarding aircraft. In 1969, revenue passenger enplanements exceeded revenue passenger originations (on each carrier's system) by 6 per cent for all local service carriers.

[c]All first-class passengers

[d]Less than 500

[e]North Central benefited from an extended strike at Northwest (see Appendix D).

Appendix I

AVERAGE NUMBER OF EMPLOYEES BY CATEGORY, 1975-78

Table I.1

Average Number of Employees by Category[a]
Air Canada and CP Air, 1975-78

Year	Average Number of Employees[a]						
	Pilots & Copilots[b]	Other Flt. Personnel[c]	Maint. Labour[d]	Aircraft & Traffic Servicing[e]	General Mgt.[f]	Other Employees[g]	Total
				A. Air Canada			
1975	1,511	2,796	3,332	7,451	122	5,841	21,053
1976[h]	1,512	2,840	3,202	7,498	123	5,665	20,840
1977[h]	1,489	2,663	3,034	7,456	135	5,587	20,364
1978[h]	1,482	2,760	2,982	7,695	135	5,405	20,459
				B. CP Air			
1975	582	883	1,167	1,932	95	3,037	7,696
1976[h]	556	891	1,154	1,848	67	2,821	7,337
1977[h]	528	835	1,130	1,832	79	2,451	6,855
1978	526	839	1,129	1,957	83	2,455	6,989

Sources: CTC(A) (c), pp. 55-56; SC(ASC) (b), Table 4; telephone conversations with M. Singer (Assistant to the Director of Industrial Relations, Canadian Air Line Pilots Association), Feb. 13, 1980 and G. Baldwin [SC(ASC)], Oct. 19, 1979

[a]Weighted average number of total system employees. Part-time, seasonal or contractual employees converted to full-time equivalents using man-hours worked

[b]Captains, first officers and second officers

[c]Cabin attendants. Flight engineers and navigators were not used during these years.

[d]Personnel used in maintaining property and equipment of all types and classes

[e]Personnel (including direct supervisory) assigned to ground activities concerned with protecting and controlling aircraft in flight, scheduling and preparing flight crews for flight assignment, parking and servicing aircraft, and servicing and handling passengers and cargo including reservations

[f]General officers and supervisors and immediate assistants responsible for an activity not provided for in a specific profit and loss account or an activity involving two or more such accounts

[g]Personnel (including direct supervisory) such as accountants, economists, statisticians, maintenance record clerks, stores receiving and issuing clerks, file clerks, lawyers, law clerks, traffic solicitors, purchasing personnel, etc. SC(ASC) advised that Air Canada reports trainees, instructors and communications personnel in this category. CP Air, however, allocates trainees and instructors to the various categories depending on where they work. A few communications personnel are reported as general management, but the majority are in this category.

[h]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

Table I.2

Average Number of Employees by Category[a]
Trans World, Northwest and Delta, 1975-78

Year	Average Number of Employees[a]						
	Pilots & Copilots[b]	Other Flt. Personnel[c]	Maint. Labour[d]	Aircraft & Traffic Servicing[e]	General Mgt.[f]	Other Employees[g]	Total
				A. Trans World			
1975	3,465	4,757	6,411	11,830	42	8,382	34,887
1976	3,500	4,913	6,132	11,770	35	8,440	34,790
1977	3,654	5,253	6,286	12,453	31	8,555	36,232[h]
1978	3,617	5,616	5,752	11,915	27	8,973	35,900[h]
				B. Northwest			
1975[h]	1,480	2,048	1,220	4,508	37	1,832	11,125
1976	1,456	2,120	1,188	4,518	37	1,848	11,167
1977	1,478	2,207	1,242	4,562	38	1,808	11,335[i]
1978[h]	848	1,292	898	3,453	35	1,510	8,036[i]
				C. Delta			
1975	2,918	3,964	3,608	14,319	48	3,321	28,178
1976	3,000	4,265	3,648	14,388	47	3,248	28,596
1977	3,086	4,536	3,577	14,946	47	3,260	29,452
1978	3,260	5,068	3,564	16,915	49	3,425	32,281

Sources: CAB (a), pp. 307-10 and (g)

[a]Total system employees
1975-76: simple average of the number of full- and part-time employees who worked or received pay for any part of the pay period ending nearest the 15th day of the last month of each quarter. Giving full weight to part-time employees results in a slight increase relative to the averages for Canadian carriers and for U.S. carriers in 1977-78.
1977-78: weighted average number of full-time employees who received pay for any part of the calendar year. Temporary or part-time employees were converted to full-time equivalents based on a 2,080-hour year with overtime excluded from the computation.

[b]Captains, first officers and second officers. Includes flight engineers and navigators for Trans World since these functions were performed by pilots at Northwest and Delta (as well as Canadian carriers)

(cont.)

Table I.2 (continued)

[c]Cabin attendants

[d]Personnel assigned to specific property and equipment maintenance projects

[e]Personnel (including direct supervisory) assigned to ground activities concerned with protecting and controlling aircraft in flight, scheduling and preparing flight crews for flight assignment, parking and servicing aircraft, and servicing and handling passengers and cargo including reservations. This information is reported in nine or ten subcategories by the U.S. carriers, but Canadian carriers report only the overall total.

[f]General officers and supervisors, and immediate assistants responsible for an activity not provided for in a specific profit and loss account or an activity involving two or more such accounts. The small numbers of such personnel for U.S. relative to Canadian carriers imply either different interpretations of essentially identical definitions or a much more efficient utilization of management personnel by the U.S. carriers.

[g]Personnel (including supervisory) whose primary duties relate to maintaining records or conducting economic or other analysis required for general management controls, such as accountants, economists, statisticians, maintenance record clerks, stores record clerks, stores receiving and issuing clerks, and file clerks. Also includes lawyers and law clerks, traffic solicitors, purchasing personnel, trainees, instructors, unallocated shop labour, communications personnel, and hotel, restaurant and food service personnel. Again, this information is reported in eight subcategories by the U.S. carriers, but Canadian carriers report only the overall total.

[h]Service interrupted by one or more strikes having a significant impact on operations (see Appendix D)

[i]Trans World's total employees were allocated between domestic and international operations as follows: 1977 -- 27,179 and 9,053; 1978 -- 26,058 and 9,842.

[j]Northwest's total employees were allocated between domestic and international operations as follows: 1977 -- 8,306 and 3,029; 1978 -- 5,600 and 2,436.

Table I.3

Average Number of Employees by Category[a]
Air California, Air Florida, PSA and Southwest, 1975-78

Year	Average Number of Employees[a]						
	Pilots & Copilots[b]	Other Flt. Personnel[c]	Maint. Labour[d]	Aircraft & Traffic Servicing[e]	General Mgt.[f]	Other Employees[g]	Total
			A. Air California[h]				
1975	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	658
1976	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	737
1977	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	900
1978	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,088
			B. Air Florida[i]				
1975	10	19	13	31	11	9	93
1976	16	20	12	28	8	8	92
1977	19	33	18	96	9	30	205
1978	45	61	35	183	22	64	410
			C. PSA[j]				
1975	354	481	444	1,092	20	367	2,758
1976	351	450	408	1,081	22	352	2,664
1977	377	480	417	1,213	15	385	2,887
1978	446	584	494	1,415	18	496	3,453
			D. Southwest[k]				
1975	36	60	35	177	14	46	368
1976	47	74	48	218	21	49	457
1977	78	117	74	394	23	62	748
1978	113	179	88	545	27	72	1,024

Sources: Air California (a), 1976; Air Florida (d), (i), (j) and (l); Air Transport World, May 1979, p. 62; PSA (d) and (f), 1978, p. 2; Southwest (c)

(cont.)

Table I.3 (continued)

[a]Total system employees

[b-g]Same as Table I.2

[h]Simple average of total employment as of December 31 for the year specified and the prior year. The extent to which part-time employees are included is unknown.

[i]Simple average of total employment based on data for June, July and December 1975 and 1976, and for 12 months for 1977 and 1978. Limited data indicate part-time employees generally comprised around eight per cent of total employees. Thus, assuming half-time work for these employees, full-time employment was estimated to be 96 per cent of all employees (full- and part-time) totaling 97, 96, 214 and 427 for the four years. Total employees were allocated among categories on the basis of detailed information for June and December 1975-77, and June and August through December 1978.

[j]Simple average of employment by category for the pay period at the end of December 1974 and 1975 (for 1975) or for a pay period in each quarter (for 1976-78). The quarterly data for 1976-78 indicate year-end data underestimate average annual employment by approximately two per cent. Therefore, the 1975 average was increased by that amount to yield the numbers given in this appendix. Part-time employees (ranging in number from 26 to 57) were converted to full-time equivalents by assuming half-time work for these employees. Figures include employees of Pacific Southwest Airmotive (233, 194, 181 and 182 for the four years). Approximately 23 per cent of the maintenance services performed by Airmotive was for PSA. Excludes employees of PSA's antihijacking security unit (approximately 100 employees during these years) since most airlines use local contractors for this service. This unit was disbanded at the end of 1978.

[k]Simple average of employment by category for each month of the year. Adjustments made by Southwest for its few part-time employees and for mid-month terminations and hirings

Table I.4

Average Number of Employees by Category[a]
Eastern Provincial, Nordair, Pacific Western, Quebecair and Transair, 1975-78

Year	Average Number of Employees[a]						
	Pilots & Copilots[b]	Other Flt. Personnel[c]	Maint. Labour[d]	Aircraft & Traffic Servicing[e]	General Mgt.[f]	Other Employees[g]	Total
				A. Eastern Provincial			
1975	92	157	245	230	27	84	835
1976[h]	90	134	250	238	27	86	825
1977[h]	83	116	250	254	29	95	827
1978	88	115	254	272	28	118	875
				B. Nordair			
1975	144	126	189	214	22	214	909
1976[h]	137	139	179	228	22	206	911
1977[h]	114	133	164	229	25	190	856
1978[h]	128	132	163	228	34	200	885
				C. Pacific Western			
1975	282	225	486	782	397[i]	43[i]	2,215
1976[h]	266	256	480	827	399	15	2,243
1977[h]	284	306	495	886	394	11	2,376
1978[h]	284	313	502	909	412	8	2,428
				D. Quebecair			
1975	116	157	150	261	150[i]	45[i]	879
1976[h]	134	132	149	251	142	41	849
1977[h]	154	156	168	268	169	34	949
1978[h]	146	159	149	253	176	133	1,016
				E. Transair			
1975[h]	90	94	136	125	97[i]	95[i]	637
1976[h]	90	92	158	142	98	122	702
1977[h]	90	92	158	142	98	126	706
1978	90	85	158	145	98	130	706

Sources: Same as Table I.1

[a-h]Same as Table I.1

[i]It appears that Pacific Western, Quebecair and perhaps Transair use significantly different criteria than the other Canadian carriers in assigning personnel to the "General Management" and "Other Employees" categories.

Table I.5

Average Number of Employees by Category[a]
Allegheny, Frontier, North Central and Southern, 1975-78

Year	Average Number of Employees[a]						
	Pilots & Copilots[b]	Other Flt. Personnel[c]	Maint. Labour[d]	Aircraft & Traffic Servicing[e]	General Mgt.[f]	Other Employees[g]	Total
				A. Allegheny			
1975	904	797	1,072	3,474	40	1,149	7,436
1976	890	864	1,097	3,615	39	1,189	7,694
1977	931	882	1,153	3,756	35	1,206	7,963
1978	1,010	985	1,178	3,971	35	1,280	8,459
				B. Frontier			
1975	509	330	643	1,424	46	656	3,608
1976	498	379	639	1,503	44	688	3,751
1977	530	435	663	1,567	43	712	3,950
1978	645	520	771	1,852	45	795	4,628
				C. North Central			
1975	458	327	521	1,490	15	589	3,400
1976	488	378	532	1,534	16	604	3,552
1977	522	458	537	1,623	16	630	3,786
1978	564	537	557	1,821	15	670	4,164
				D. Southern			
1975	314	261	222	1,123	25	537	2,482
1976	326	286	234	1,241	25	607	2,719
1977	332	294	243	1,133	26	587	2,615
1978	414	331	322	1,366	23	685	3,141

Sources: Same as Table I.2

[a-g]Same as Table I.2

Appendix J

TOTAL SALARIES AND WAGES AND EMPLOYEE BENEFITS, 1978

Table J.1

Total Salaries and Wages Paid to Employees by Category
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	Annual Salaries and Wages (Canadian & U.S. Dollars)						
	Pilots & Copilots	Other Flt. Personnel	Maintenance Labour	A/C & Traf. Servicing	General Mgt.	Other Employees	Total
Mainline[a]							
Air Canada	62,373,328	45,327,680	58,701,047	137,604,034	6,993,895	107,470,459	418,470,443
CP Air	23,414,187	15,418,022	21,361,464	34,881,405	2,910,280	43,811,973	140,797,331
Trunk							
Trans World	184,801,741[b]	88,615,899	121,912,602	223,776,268	3,810,566	198,591,796[c]	821,508,872
Northwest	49,378,180	19,951,165	19,245,017	61,487,509	2,158,110	21,236,071[c]	173,456,052
Delta	168,358,620	81,965,917	65,679,403	331,349,437	5,447,141	92,802,758	745,603,276
Intrastate							
Air Calif.[d]	5,036,000	2,202,000	2,605,000	8,733,000	n.a.[e]	n.a.[e]	20,461,000
Air Florida[f]	824,090	407,547	582,654	958,489	539,267	211,927	3,523,974
PSA	16,156,043	6,459,583	8,453,561	22,426,518	1,115,430[g]	8,026,762[g]	62,637,897
Southwest	3,618,432	1,751,950	1,810,729	6,442,887	905,650	905,490	15,435,138
Regional[a]							
East. Prov.	3,058,992	1,477,955	4,555,039	4,275,586	731,862	1,642,106	15,741,540
Nordair	4,701,919	1,741,177	3,462,462	4,040,398	1,248,830	2,700,399	17,895,185
Pac. Western	12,637,943	5,418,647	9,871,345	16,321,948	7,851,471[h]	210,846[h]	52,312,200
Quebecair	5,163,908	2,053,915	3,278,567	4,423,294	3,793,409[h]	799,457[h]	19,512,550
Transair	2,980,247	1,297,839	3,071,192	1,907,186	1,497,910[h]	1,252,143[h]	12,006,517
Local Service							
Allegheny	50,710,000	15,894,000	24,577,000	74,070,000	2,452,040	26,869,000[c]	194,572,000
Frontier	24,014,028	6,509,985	10,211,705	45,106,054	2,338,127	14,211,460	102,391,359
N. Central	25,789,356	7,589,010	9,227,459	39,946,053	1,451,894	12,858,991	96,862,763
Southern	17,091,000	4,294,000	5,675,000	23,269,000	1,164,000	11,964,000	63,457,000

Sources: See Table J.3.

Table J.1 (continued)

[a]Salaries and wages for Canadian carriers are reported to Statistics Canada in Statement 1 (as published in Air Carrier Operations in Canada, Table 4) and in Statements 12 and 13A (unpublished). Unfortunately, the data from these two sources differ by rather large amounts, as indicated by the following annual totals for 1978:

Carrier	Total Salaries & Wages, 1978		
	Statement 1	Statements 12 & 13A	Difference
Air Canada	$418,470,443	$401,680,290	$+16,790,153
CP Air	140,797,331	138,937,659	+ 1,859,672
East. Prov.	15,741,540	16,214,216	- 472,676
Nordair	17,895,185	17,487,650	+ 407,535
Pac. Western	52,312,200	53,348,561	- 1,036,361
Quebecair	19,512,550	20,997,138	- 1,484,588
Transair	12,006,517	13,969,092	- 1,962,575

One reason given for these differences is that the salaries and wages reported in Statements 12 and 13A are net of those required to produce services for other airlines. This explanation is consistent with the positive differences found for Air Canada, CP Air and Nordair, but not with the negative differences for the other carriers. Furthermore, it does not explain why both positive and negative differences (including some very large values) existed for the six employee categories for each of the carriers. Since the number of employees (Appendix I) was obtained from Statement 1, it was decided to use Statement 1 data for salaries and wages on the assumption that the two series were compiled on a consistent basis and, therefore, would yield accurate average annual payments per employee.

[b]Includes flight engineers and navigators for Trans World since these functions were performed by pilots at all other carriers

[c]Excludes hotel, restaurant and food service personnel whose wage data are not reported to the CAB

[d]All figures were partially estimated from actual data for 1977 and the first ten months of 1978 and from estimated data for the last two months of 1978 and all of 1979. The 1977 and 1979 data were used to allocate total 1978 data among the various categories.

[e]Not available, but general management and other employees, combined, received salaries and wages of approximately $1,885,000

[f]Salaries and wages paid to employees during the year ended July 31, 1978

[g]General management salaries for 15 corporate officers only. The remaining three general management employees' salaries were included in the other employees category. Wages paid to ten restaurant and food service personnel were excluded from the other employees category to be consistent with CAB practice.

[h]Pacific Western, Quebecair and Transair appear to have substantially different definitions for their general management and other employees categories (see Table I.4).

Table J.2

Total Employee Benefits by Function[a]
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	Annual Employee Benefits[a] (Canadian & U.S. Dollars)					
	Flying Operations	Passenger Service	Maintenance Burden	A/C & Traf. Servicing	Gen. & Admin. Prom. & Sales	Total
Mainline						
Air Canada	17,224,889	8,518,918	21,357,530	39,851,129	6,150,430	93,102,896
CP Air	3,450,000[b]	1,714,624	2,656,043	7,341,440	1,619,361	16,781,468[b]
Trunk						
Trans World	69,323,033	19,473,010	34,990,928	48,360,218	9,919,695	182,066,884
Northwest	23,065,212	4,794,478	5,394,964	13,727,163	1,764,503	48,746,320
Delta	51,253,373	10,757,491	21,238,749	50,905,555	4,093,258	138,248,426
Intrastate						
Air Calif.[c]	1,043,000	390,000	545,000	1,445,000	466,000	3,889,000
Air Florida[d]	n.a.	n.a.	n.a.	n.a.	n.a.	463,621
PSA	3,668,472	934,361	2,780,557	4,458,692	1,319,732	13,161,814
Southwest	n.a.	n.a.	n.a.	n.a.	n.a.	3,662,659[e]
Regional						
East. Prov.	105,000[b]	108,634	310,866	349,183	66,888	940,571[b]
Nordair	1,588,000[b]	157,015	130,847	622,599	673,554	3,172,015[b]
Pac. Western	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Quebecair	665,000[b]	n.a.	n.a.	395,718	173,637	1,234,355[b]
Transair	230,000[b]	130,423	454,604	426,478	114,268	1,355,773[b]
Local Service						
Allegheny	15,984,000	2,300,000	4,742,000	12,178,000	1,788,000	36,992,000
Frontier	8,387,815	1,117,478	2,831,783	5,810,548	2,412,049	20,559,673
N. Central	7,351,433	1,156,625	3,079,723	5,848,993	1,208,204	18,644,978
Southern	3,588,000	630,000	1,359,000	4,321,000	936,000	10,804,000

Sources and notes: See Table J.3.

Table J.3

Total Personnel Expenses by Function
Canadian Mainline, Regional and Selected U.S. Carriers, 1978

Carrier	Annual Personnel Expenses (Canadian & U.S. Dollars)					
	Flying Operations	Passenger Service	Maintenance Burden	A/C & Traf. Servicing	Gen. & Admin. Prom. & Sales	Total
Mainline						
Air Canada	7,200,082	12,388,946	1,135,049	7,335,447	1,708,681	29,768,205
CP Air	3,202,814[f]	4,912,549	147,359	2,403,211	608,216	11,274,149[f]
Trunk						
Trans World	19,354,880	25,012,267	443,680	4,124,313	998,337	49,933,477
Northwest	3,734,037	6,248,501	81,471	2,367,325	239,794	12,671,128
Delta	11,320,459	18,177,767	324,585	4,325,387	222,689	34,370,882
Intrastate						
Air Calif.[c]	326,000	458,000	24,000	33,000	86,000	927,000
Air Florida[d]	n.a.[d]	n.a.[d]	5,246	14,093	50,429	198,583
PSA	1,287,140	1,835,702	116,959	339,735	182,893	3,762,429
Southwest	261,172	279,538	8,214	38,707	77,646	665,277
Regional						
East. Prov.	371,888[f]	467,249	71,965	256,317	82,477	1,249,896[f]
Nordair	730,368[f]	724,301	24,180	628,695	121,701	2,229,245[f]
Pac. Western	982,924[f]	1,041,769	50,043	463,328	333,758	2,871,822[f]
Quebecair	484,866[f]	507,700	54,742	159,520	199,744	1,406,572[f]
Transair	195,030[f]	177,105	41,067	130,564	121,382	665,148[f]
Local Service						
Allegheny	3,977,000	4,017,000	189,000	1,075,000	310,000	9,568,000
Frontier	1,889,056	1,632,228	315,113	772,959	553,055	5,163,411
N. Central	1,778,198	1,958,370	74,032	738,034	192,958	4,741,592
Southern	1,282,000	982,000	52,000	604,000	135,000	3,055,000

(cont.)

Table J.3 (continued)

Sources: Air California (c), June 9, 1978, Appendices A and B and Dec. 28, 1978, Appendix A; Air Canada (c); CAB (d), 1978 and (e); Peat, Marwick, Mitchell & Co., "1978"; PSA (i) and (m); Southwest (h), 1978, Schedules E.1-E.7; SC(ASC) (b), 1978, Table 4, (f) and (r)

[a]Employee benefits include insurance, pensions and other welfare plans, including payroll taxes for benefits supplied through governments.

[b]Employee benefits (insurance-employee welfare) are reported only in Statements 12 and 13A for Canadian carriers and therefore may not be consistent with the salaries and wages data reported in Statement 1. Since Statement 12 combines insurance-employee welfare with other expenses for flying operations, it was necessary to estimate their values from the aggregated data. Based on disaggregated data available in Air Canada's Report 372A, the following basis was derived for estimating the other carriers' insurance-employee welfare:
Flying operations insurance-employee welfare = 0.9 of flying operations other expenses.

[c]All figures were partially estimated from actual data for 1977 and the first ten months of 1978, and from estimated data for the last two months of 1978 and all of 1979. The 1977 and 1979 data were used to allocate total 1978 data among the various functions.

[d]Year ended July 31, 1978. Flying operations and passenger service employees, combined, received personnel expenses of $128,815.

[e]Includes $2,353,100 paid in accordance with Southwest's profit sharing plans

[f]Personnel expenses are reported only in Statements 12 and 13A for Canadian carriers and therefore may not be consistent with the salaries and wages data reported in Statement 1. Since Statement 12 combines personnel expenses with salaries and wages for flying operations, it was necessary to estimate their values from the aggregated data. Based on disaggregated data available in Air Canada's Report 372A, the following basis was derived for estimating the other carriers' personnel expenses:
Flying operations personnel expenses = passenger service personnel expenses per employee x 1.04 x the number of pilots and copilots.

Appendix K

CANADIAN CARRIERS' ESTIMATED TURBINE FUEL EXPENDITURES
AND PRICES, 1975-78

Table K.1

Canadian Carriers' Estimated Turbine Fuel Expenditures and Prices Adjusted to Give U.S. Dollar Values for Fuel Purchased in the U.S. and Other Foreign Countries

A. Procedure for the Canadian Mainline Carriers[a]

1. The following actual data were recorded or calculated:

Item and Carrier		1975	1976	1977	1978
a. Scheduled & Charter Revenue Plane-Miles (thousands)					
Air Canada -	Domestic	74,102	73,414	72,275	68,860
	Transborder	18,197	20,631	20,717	24,300
	International	32,522	28,694	22,737	25,717
	System	124,820	122,739	115,729	118,877
CP Air -	Domestic	20,144	18,999	17,213	17,799
	Transborder	5,428	7,457	6,137	5,351
	International	16,721	14,487	14,990	14,995
	System	42,292	40,943	38,340	38,146
Trans World-	Domestic	207,775	213,339	215,789	208,593
	International	66,502	66,008	68,297	66,414
	System	274,277	279,347	284,086	275,007
Northwest -	Dom. & Trans.	88,028	91,362	93,410	53,944
	International	19,692	20,917	21,233	13,528
	System	107,720	112,279	114,643	67,472
b. Fuel Consumption (thousands of litres)					
Air Canada -	System	1,895,387	1,847,106	1,767,680	1,783,898
CP Air -	System	702,926	676,893	666,306	670,154
Trans World-	Domestic	3,230,492	3,220,484	3,285,289	3,196,548
	International	1,285,286	1,228,019	1,313,606	1,323,437
	System	4,515,778	4,448,503	4,598,895	4,519,985
Northwest -	Dom. & Trans.	1,739,196	1,798,287	1,847,195	1,107,599
	International	508,661	542,327	552,586	376,337
	System	2,247,857	2,340,614	2,399,781	1,483,936

Table K.1 (continued)

1. (continued)

Item and Carrier	1975	1976	1977	1978
c. Fuel Consumed per Revenue Plane-Mile (litres)				
Air Canada - System	15.185	15.049	15.274	15.006
CP Air - System	16.621	16.532	17.379	17.568
Trans World- Domestic	15.548	15.096	15.225	15.324
International	19.327	18.604	19.234	19.927
System	16.464	15.925	16.188	16.436
Northwest - Dom. & Trans.	19.757	19.683	19.775	20.532
International	25.831	25.928	26.025	27.819
System	20.868	20.846	20.933	21.993
d. Fuel Consumption Ratios to System Totals				
Trans World- Domestic	.944	.948	.941	.932
International	1.174	1.168	1.188	1.212
System	1.000	1.000	1.000	1.000
Northwest - Dom. & Trans.	.947	.944	.945	.934
International	1.238	1.244	1.243	1.265
System	1.000	1.000	1.000	1.000
e. Fuel Expenses (thousands of Canadian or U.S. dollars)[b]				
Air Canada - System	$169,300	$189,124	$205,850	$229,916
CP Air - System	69,125	71,944	77,506	89,638
Trans World- Domestic	256,048	266,885	323,003	336,851
International	125,419	122,047	141,618	148,193
System	381,467	388,932	464,621	485,044
Northwest - Dom. & Trans.	142,677	155,403	183,579	116,906
International	47,060	52,237	56,033	42,061
System	189,737	207,640	239,612	158,967
f. Average U.S. Domestic Fuel Prices (U.S. cents per litre)[b]				
Trans World- Domestic	7.895¢	8.262¢	9.801¢	10.496¢
Northwest - Dom. & Trans.	8.190	8.612	9.895	10.501

(cont.)

Table K.1 (continued)

2. The following estimates were calculated using the above actual data:

Item and Carrier		1975	1976	1977	1978
a. Estimated fuel consumed per revenue plane-mile (litres). (Items 1.c. for Air Canada and CP Air multiplied by item 1.d. for Trans World and Northwest, respectively.)					
Air Canada -	Domestic	14.335	14.266	14.373	13.986
	Transborder	14.335	14.266	14.373	13.986
	International	17.827	17.577	18.146	18.187
CP Air -	Domestic	15.740	15.606	16.423	16.409
	Transborder	15.740	15.606	16.423	16.409
	International	20.577	20.566	21.602	22.224
b. Estimated fuel consumption by operating area (thousands of litres). (Item 1.a. multiplied by item 2.a. for Air Canada and CP Air, with resulting figures adjusted proportionally to equal actual system fuel consumption in item 1.b.)					
Air Canada -	Domestic	1,066,109	1,047,945	1,049,808	970,287
	Transborder	247,408	294,504	300,923	342,402
	International	581,870	504,656	416,948	471,210
CP Air -	Domestic	298,530	282,349	266,300	274,468
	Transborder	80,440	110,827	94,947	82,515
	International	323,957	283,717	305,048	313,171
c. Estimated fuel consumption by country of purchase (thousands of litres). [Item 1.b. (for Trans World and Northwest) and item 2.b. (for Air Canada and CP Air) allocated assuming half of all fuel was purchased in the country of origin and half in the country of destination.]					
Air Canada -	Canada	1,480,748	1,447,525	1,408,743	1,377,093
	U.S.	123,704	147,252	150,462	171,201
	Other Countries	290,935	252,328	208,474	235,605
CP Air -	Canada	500,728	479,621	466,297	472,311
	U.S.	40,220	55,413	47,474	41,258
	Other Countries	161,979	141,859	152,524	156,585
Trans World-	U.S.	3,873,135	3,834,494	3,942,092	3,858,267
	Other Countries	642,643	614,009	656,803	661,718
Northwest -	U.S.	1,993,527	2,069,450	2,123,488	1,295,767
	Other Countries	254,330	271,164	276,293	188,168

Table K.1 (continued)

2. (continued)

Item and Carrier		1975	1976	1977	1978
d. Estimated average prices paid by Trans World and Northwest for fuel purchased in other countries (U.S. cents per litre). [Fuel purchased in the U.S. (item 2.c.) times domestic fuel prices (item 1.f.) subtracted from system fuel expenses (item 1.e.) equals expenditures on fuel purchased in other countries. Dividing this figure by estimated fuel purchased in other countries (item 2.c.) yields estimated average price for this fuel.]					
Trans World-	Other Countries	11.777¢	11.747¢	11.915¢	12.102¢
Northwest -	Other Countries	10.406	10.849	10.674	12.169
e. Estimated expenses for fuel purchased in the U.S. and other countries (thousands of U.S. dollars). [Multiply Air Canada and CP Air's estimated fuel consumption by country of purchase (item 2.c.) by the fuel prices for Trans World and Northwest given in item 1.f. (for U.S. purchases) and item 2.d. (for purchases in other countries).]					
Air Canada -	U.S.	U.S. $9,766	$12,166	$14,747	$17,969
	- Other Countries	34,263	29,641	24,840	28,513
CP Air	- U.S.	3,294	4,772	4,697	4,333
	Other Countries	16,856	15,390	16,280	19,054
f. Estimated expenses for fuel purchased in the U.S. and in other countries (thousands of Canadian dollars). (Multiply the estimates in item 2.e. by the following Canadian/U.S. exchange rates: 1975 = 1.017, 1976 = .986, 1977 = 1.063 and 1978 = 1.141.)					
Air Canada -	U.S.	Can. $9,932	$11,996	$15,676	$20,503
	Other Countries	34,846	29,226	26,404	32,533
CP Air	- U.S.	3,350	4,705	4,993	4,943
	Other Countries	17,142	15,175	17,306	21,741
g. Estimated expenses for fuel purchased in Canada (thousands of Canadian dollars). [Subtract estimated expenses for fuel purchased in the U.S. and other countries (item 2.f.) from system fuel expenses (item 1.e.).]					
Air Canada -	Canada	Can. $124,522	$147,902	$163,770	$176,380
CP Air	- Canada	48,633	52,064	55,207	62,954

(cont.)

Table K.1 (continued)

2. (continued)

Item and Carrier	1975	1976	1977	1978
h. Estimated system fuel expenses with fuel purchased in the U.S. and other countries adjusted for exchange rates. [Estimated expenses for fuel purchased in Canada (item 2.g. in thousands of Canadian dollars) plus estimated expenses for fuel purchased in the U.S. and other countries (item 2.a. in thousands of U.S. dollars).]				
Air Canada - System	$168,551	$189,709	$203,356	$223,362
CP Air - System	68,783	72,227	76,185	86,341
i. Estimated average system fuel prices as shown in Table 25 (Canadian/U.S. cents per litre). [Estimated system fuel expenses adjusted for exchange rates (item 2.h.) divided by system fuel consumption (item 1.b.).]				
Air Canada - System	8.893¢	10.271¢	11.504¢	12.521¢
CP Air - System	9.785	10.670	11.434	12.884
j. Estimated average domestic fuel prices as shown in Table 24 (Canadian cents per litre). [Estimated expenses for fuel purchased in Canada (item 2.g.) divided by estimated quantities of fuel purchased (item 2.c.).]				
Air Canada - Domestic	8.409¢	10.218¢	11.625¢	12.844¢
CP Air - Domestic	9.713	10.855	11.839	13.329

Table K.1 (continued)

B. Procedure for the Canadian Regional Carriers

1. The following actual data were recorded or calculated:[a]

Item and Carrier		1975	1976	1977	1978
a. Scheduled and Charter Revenue Plane-Miles Flown with Turbine-Powered Aircraft (thousands)					
East. Prov.	-Domestic	4,875	4,894	5,311	5,674
	Transborder	1,032	1,054	852	838
	International	0	0	0	0
	System	5,907	5,948	6,184	6,512
Nordair	-Domestic	4,725	4,855	4,684	4,874
	Transborder	1,667[d]	1,977[d]	2,496[d]	2,288[d]
	International	1,914	2,877	2,537	2,857
	System	8,306	9,709	9,717	10,019
Pac. Western	-Domestic	11,946	10,747	11,861	12,174
	Transborder	1,526	1,848	2,259	2,012
	International	2,275	2,152	2,871	2,369
	System	15,748	14,748	16,991	16,556
Quebecair[c]	-Domestic	4,301	4,421	4,374	4,445
	Transborder	794	700	777	809
	International	2,841	2,516	3,363	3,283
	System	7,935	7,637	8,514	8,536
Transair	-Domestic	4,435	4,863	5,126	5,885
	Transborder	503	670	812	993
	International	864	1,250	774	757
	System	5,802	6,783	6,713	7,634
b. Fuel Consumption (thousands of litres)					
East. Prov.	-System	72,153	70,584	71,749	75,645
Nordair	-System	83,718	106,672	103,118	105,109
Pac. Western	-System	187,449	172,119	202,763	206,650
Quebecair[c]	-System	94,610	87,969	113,995	115,348
Transair	-System	62,072	72,554	67,597	75,040
Allegheny	-Dom. & Trans.	833,863	855,213	863,637	904,264
Frontier	-Dom. & Trans.	274,677	307,150	336,015	397,691
N. Central	-Dom. & Trans.	292,945	318,572	353,426	405,058

(cont.)

Table K.1 (continued)

1. (continued)

Item and Carrier	1975	1976	1977	1978
c. Fuel Consumed per Revenue Plane-Mile (litres)				
East. Prov. -System	12.2153	11.8672	11.6030	11.6161
Nordair -System	10.0795	10.9866	10.6120	10.4908
Pac. Western-System	11.9031	11.6710	11.9338	12.4820
Quebecair[c] -System	11.9227	11.5192	13.3894	13.5129
Transair -System	10.6990	10.6967	10.0695	9.8291
d. Fuel Expenses (thousands of Canadian or U.S. dollars)[b]				
East. Prov. -System	7,470	7,912	8,872	10,015
Nordair -System	9,271	12,484	13,781	15,303
Pac. Western-System	18,511	18,583	26,493	30,172
Quebecair -System	9,504	9,679	14,464	16,109
Transair -System	5,718	7,645	7,878	10,032
Allegheny -System[e]	61,883	74,691	86,078	96,206
Frontier -System[e]	21,452	27,295	33,461	43,339
N. Central -System[e]	24,579	27,920	35,619	44,231
e. Average U.S. Domestic Fuel Prices (U.S. cents per litre)[b]				
Allegheny -Dom. & Trans.	7.421¢	8.734¢	9.967¢	10.639¢
Frontier -Dom. & Trans.	7.810	8.886	9.958	10.898
N. Central -Dom. & Trans.	8.390	8.764	10.078	10.920
Three Carrier Average	7.700	8.772	9.990	10.766

Table K.1 (continued)

2. The following estimates were calculated using the above actual data:[a]

Item and Carrier		1975	1976	1977	1978
a. Estimated fuel consumption by operating area (thousands of litres). (Item 1.a. multiplied by item 1.c., with resulting figures adjusted proportionally to equal actual system fuel consumption in item 1.b.)					
East. Prov.	-Domestic	59,550	58,074	61,622	65,912
	Transborder	12,603	12,510	9,884	9,733
	International	0	0	243	0
Nordair	-Domestic	47,630	53,338	49,704	51,136
	Transborder	16,800	21,722	26,490	23,999
	International	19,287	31,612	26,924	29,974
Pac. Western	-Domestic	142,200	125,432	141,549	151,961
	Transborder	18,165	21,573	26,957	25,118
	International	27,084	25,114	34,257	29,571
Quebecair[c]	-Domestic	51,277	50,922	58,561	60,060
	Transborder	9,466	8,059	10,404	10,928
	International	33,867	28,988	45,030	44,361
Transair	-Domestic	47,451	52,016	51,618	57,843
	Transborder	5,380	7,171	8,181	9,759
	International	9,241	13,367	7,798	7,438
b. Estimated fuel consumption by country of purchase (thousands of litres). (Item 2.a. allocated assuming half of all fuel was purchased in the country of origin and half in the country of destination.)					
East. Prov.	-Canada	65,851	64,329	66,686	70,779
	U.S.	6,302	6,255	4,942	4,866
	Other Countries	0	0	121	0
Nordair	-Canada	65,674	80,005	76,411	78,123
	U.S.	8,400	10,861	13,245	11,999
	Other Countries	9,644	15,806	13,462	14,987
Pac. Western	-Canada	164,825	148,776	172,156	179,306
	U.S.	9,082	10,786	13,479	12,559
	Other Countries	13,542	12,557	17,128	14,785
Quebecair[c]	-Canada	72,943	69,445	86,278	87,704
	U.S.	4,733	4,030	5,202	5,464
	Other Countries	16,934	14,494	22,515	22,180
Transair	-Canada	54,762	62,285	59,608	66,442
	U.S.	2,690	3,586	4,090	4,879
	Other Countries	4,620	6,683	3,899	3,719

(cont.)

Table K.1 (continued)

2. (continued)

Item and Carrier		1975	1976	1977	1978
c. Estimated expenses for fuel purchased in the U.S. and other countries (thousands of U.S. dollars). [Multiply regional carriers' estimated fuel consumption by country of purchase (item 2.b.) by the average domestic fuel prices[d] of the three local service carriers given in item 1.e. (for U.S. purchases) or by the international fuel prices for Trans World given in item A.2.d. (for purchases in other countries).]					
East. Prov.	-U.S.	U.S. $ 485	$ 549	$ 494	$ 524
	Other Countries	0	0	15	0
Nordair	-U.S.	647	953	1,323	1,292
	Other Countries	1,136	1,857	1,604	1,814
Pac. Western	-U.S.	699	946	1,347	1,352
	Other Countries	1,595	1,475	2,041	1,789
Quebecair	-U.S.	364	353	520	588
	Other Countries	1,994	1,703	2,683	2,684
Transair	-U.S.	207	315	409	525
	Other Countries	544	785	465	450
d. Estimated expenses for fuel purchased in the U.S. and other countries (thousands of Canadian dollars). (Multiply the estimates in item 2.c. by the following Canadian/U.S. exchange rates: 1975 = 1.017, 1976 = .986, 1977 = 1.063, 1978 = 1.141.)					
East. Prov.	-U.S.	Can. $ 493	$ 541	$ 525	$ 598
	Other Countries	0	0	15	0
Nordair	-U.S.	658	939	1,407	1,474
	Other Countries	1,155	1,831	1,705	2,069
Pac. Western	-U.S.	711	933	1,431	1,543
	Other Countries	1,622	1,454	2,169	2,042
Quebecair	-U.S.	371	349	552	671
	Other Countries	2,028	1,679	2,852	3,063
Transair	-U.S.	211	310	434	599
	Other Countries	553	774	494	514

Table K.1 (continued)

2. (continued)

Item and Carrier	1975	1976	1977	1978
e. Estimated expenses for fuel purchased in Canada (thousands of Canadian dollars). [Subtract estimated expenses for fuel purchased in the U.S. and other countries (item 2.d.) from system fuel expenses (item 1.d.).]				
East. Prov. -Canada	Can. $6,976	$7,371	$8,332	$9,417
Nordair -Canada	7,459	9,714	10,669	11,759
Pac. Western-Canada	16,177	16,195	22,892	26,588
Quebecair -Canada	7,105	7,652	11,060	12,375
Transair -Canada	4,954	6,561	6,950	8,919
f. Estimated system fuel expenses with fuel purchased in the U.S. and other countries adjusted for exchange rates. [Estimated expenses for fuel purchased in Canada (item 2.e. in thousands of Canadian dollars) plus estimated expenses for fuel purchased in the U.S. and other countries (item 2.c. in thousands of U.S. dollars).]				
East. Prov. -System	$7,462	$7,920	$8,840	$9,941
Nordair -System	9,241	12,524	13,596	14,865
Pac. Western-System	18,472	18,617	26,280	29,730
Quebecair -System	9,464	9,708	14,262	15,648
Transair -System	5,705	7,661	7,823	9,894
g. Estimated average system fuel prices as shown in Table 25 (Canadian/U.S. cents per litre). [Estimated system fuel expenses adjusted for exchange rates (item 2.f.) divided by system fuel consumption (item 1.b.).]				
East. Prov. -System	10.341¢	11.220¢	12.321¢	13.142¢
Nordair -System	11.038	11.740	13.185	14.142
Pac. Western-System	9.854	10.816	12.961	14.386
Quebecair -System	10.003	11.035	12.511	13.565
Transair -System	9.191	10.559	11.573	13.185

(cont.)

Table K.1 (continued)

2. (continued)

Item and Carrier	1975	1976	1977	1978
h. Estimated average domestic fuel prices as shown in Table 24 (Canadian cents per litre). [Estimated expenses for fuel purchased in Canada (item 2.e.) divided by estimated quantities of fuel purchased (item 2.b.).]				
East. Prov. -Domestic	10.594¢	11.458¢	12.494¢	13.305¢
Nordair -Domestic	11.357	12.142	13.963	15.052
Pac. Western-Domestic	9.815	10.886	13.297	14.828
Quebecair -Domestic	9.741	11.018	12.818	14.110
Transair -Domestic	9.046	10.534	11.660	13.423

Sources: CAB (e); SC(ASC) (b), Table 4 and telephone conversation with R. Lortie, Feb. 20, 1981; telephone conversations with:
E. Ashburn (Director -- General Accounting, Trans World), Oct. 9, 1980;
S. Hoerdegen (Director -- Accounts Payable, U.S. Air), Oct. 21, 1980;
K. Johnson (Director -- Cost Accounting, Northwest), Oct. 22, 1980;
M. Meyer (Vice President & Controller, Republic), Oct. 17, 1980;
R. Uhrich (Manager -- General Accounting, Frontier), Oct. 17, 1980

[a]Many of the data in this appendix are rounded to the nearest thousand. All calculations, however, used unrounded data. Therefore, slight discrepancies may exist between some of the calculated values listed in this appendix and values obtained from calculations using rounded data.

[b]Includes all taxes and fuel-related airport fees

[c]Plane-mile data are for the following aircraft operated by Quebecair: BAC-111, B-727-100, B-707-123 and F-27. Statistics Canada is unsure about whether or not the turbine fuel reported for Quebecair is for these aircraft only, especially for years prior to 1977. It is possible that some fuel utilized by Quebecair's subsidiaries, Les Ailes due Nord and Air Fecteau, is included in the fuel consumption data. During 1975-78, these two carriers operated replacement service over Quebecair's routes 3 and 6 utilizing small turbine aircraft.

[d]Partially estimated

[e]System operations for these local service carriers were essentially domestic. Transborder operations included in these data probably comprise less than two per cent of system operations (see note e, Table 6).

[f]Domestic fuel prices include prices paid for a small amount of fuel purchased in Canada for transborder operations. The effect of these small purchases on average U.S. domestic prices is insignificant.

Appendix L

DOMESTIC FUEL PRICES NET OF TAXES AND AIRPORT FEES, 1975-78

Table L.1

Domestic Fuel Prices Net of Taxes and Airport Fees
Canadian Mainline, Regional and Selected U.S. Carriers, 1975-78

Carrier	Item	Canadian or U.S. Cents/Litre 1975	1976	1977	1978
Mainline					
Air Canada	Gross Domestic Price[a,b]	8.409	10.218	11.625	12.844
	Federal Sales Tax[c]	.830	1.024	1.175	1.269
	Provincial Fuel Tax[d]	.660	.660	.660	.660
	Airport Fee	.330	.330	.330	.330
	Net Fuel Price	6.589	8.204	9.460	10.585
CP Air	Gross Domestic Price[a,b]	9.713	10.855	11.839	13.329
	Federal Sales Tax[c]	1.970	1.092	1.198	1.320
	Provincial Fuel Tax[d]	.660	.660	.660	.660
	Airport Fee	.330	.330	.330	.330
	Net Fuel Price	7.753	8.773	9.651	11.019
Trunk					
Trans World	Gross Domestic Price[b]	7.895	8.262	9.801	10.496
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.019	.149	.227	.236
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	7.776	8.013	9.474	10.160
Northwest	Gross Domestic Price[b]	8.190	8.612	9.895	10.501
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.083	.173	.233	.224
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	8.007	8.339	9.562	10.177
Delta	Gross Domestic Price[b]	7.656	8.295	9.569	10.293
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.100	.112	.200	.223
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	7.456	8.083	9.269	9.970
Intrastate					
Air Calif.	Gross Domestic Price[b]	n.a.	n.a.	n.a.	11.719[a]
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	n.a.	n.a.	n.a.	.558[a]
	Airport Fee	n.a.	n.a.	n.a.	n.a.
	Net Fuel Price	n.a.	n.a.	n.a.	n.a.
Air Florida	Gross Domestic Price[b]	n.a.	n.a.	n.a.	10.750[e]
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	0	0	0	0
	Airport Fee	n.a.	n.a.	n.a.	n.a.
	Net Fuel Price	n.a.	n.a.	n.a.	n.a.

Table L.1 (continued)

Carrier	Item	Canadian or U.S. Cents/Litre 1975	1976	1977	1978
PSA	Gross Domestic Price[b]	8.177	8.898	10.195	10.854
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.384	.417	.479	.508
	Airport Fee	.105	.133	.141	.181
	Net Fuel Price	7.688	8.348	9.575	10.165
Southwest	Gross Domestic Price[b]	8.198	8.335	9.820	10.244
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	0	0	0	0
	Airport Fee	.280	.278	.245	.201
	Net Fuel Price	7.918	8.057	9.575	10.043
Regional East. Prov.	Gross Domestic Price[a,b]	10.549	11.458	12.494	13.305
	Federal Sales Tax[c]	1.100	1.192	1.303	1.352
	Provincial Fuel Tax[f]	.330	.330	.330	.330
	Airport Fee	.330	.330	.330	.330
	Net Fuel Price	8.834	9.606	10.531	11.293
Nordair	Gross Domestic Price[b]	11.357	12.142	13.963	15.052
	Federal Sales Tax[c]	1.146	1.230	1.425	1.499
	Provincial Fuel Tax[d]	.660	.660	.660	.660
	Airport Fee	.330	.330	.330	.330
	Net Fuel Price	9.221	9.922	11.548	12.563
Pac. Western	Gross Domestic Price[a,b]	9.815	10.886	13.297	14.828
	Federal Sales Tax[c]	.957	1.072	1.330	1.453
	Provincial Fuel Tax[g]	.880	.880	.880	.880
	Airport Fee	.330	.330	.330	.330
	Net Fuel Price	7.648	8.604	10.757	12.165
Quebecair	Gross Domestic Price[a,b]	9.741	11.018	12.818	14.110
	Federal Sales Tax[c]	.973	1.110	1.303	1.401
	Provincial Fuel Tax[d]	.660	.660	.660	.660
	Airport Fee	.330	.330	.330	.330
	Net Fuel Price	7.778	8.918	10.525	11.719
Transair	Gross Domestic Price[a,b]	9.046	10.534	11.660	13.423
	Federal Sales Tax[c]	.875	1.034	1.155	1.307
	Provincial Fuel Tax[h]	.880	.880	.880	.880
	Airport Fee	.330	.330	.330	.330
	Net Fuel Price	6.961	8.290	9.259	10.906
Local Service Allegheny	Gross Domestic Price[b]	7.421	8.734	9.967	10.639
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.122	.149	.154	.165
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	7.199	8.485	9.713	10.374

(cont.)

Table L.1 (continued)

Carrier	Item	Canadian or U.S. Cents/Litre 1975	1976	1977	1978
Frontier	Gross Domestic Price[b]	7.810	8.886	9.958	10.898
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.293	.335	.355	.374
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	7.417	8.451	9.503	10.424
N. Central	Gross Domestic Price[b]	8.390	8.764	10.078	10.920
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.205	.219	.270	.301
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	8.085	8.445	9.708	10.519
Southern	Gross Domestic Price[b]	7.409	8.449	9.791	10.365
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.251	.282	.322	.313
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	7.058	8.067	9.369	9.952
Three Carrier Average[i]	Gross Domestic Price[b]	7.700	8.772	9.990	10.766
	Federal Sales Tax	0	0	0	0
	State Fuel Tax	.173	.202	.224	.246
	Airport Fee[a]	.100	.100	.100	.100
	Net Fuel Price	7.427	8.470	9.666	10.420

Sources: Appendix K; CAB (e) and (p), Nov. 1979, p. 155; letter from R. Ward (Marketing Department, Imperial Oil), Dec. 1, 1980; telephone conversations with individuals listed in Table 23 sources

[a]Estimated (see Appendix K and p. 107)

[b]Price of fuel plus fuel taxes and fuel-related airport fees

[c]The Canadian federal sales tax is applied to the retail price including the airport fee but before provincial taxes. It was 12 per cent from 1975 to November 16, 1978. Effective November 17, 1978, it was reduced to 9 per cent, yielding an average for 1978 of about 11.63 per cent. There was no U.S. federal sales tax on turbine fuel used by the airlines during 1975-78.

[d]Based on the assumption that most fueling was done in some or all of the five provinces with fuel taxes of .660 cents per litre (see p. 107)

[e]Year ended July 31, 1978

[f]Simple average of the fuel taxes in Newfoundland, Nova Scotia, P.E.I. and Quebec (0, .66, 0, .66 cents per litre, respectively)

[g]Simple average of the fuel taxes in Alberta and British Columbia (.66 and 1.10 cents per litre, respectively)

[h]Simple average of the fuel taxes in Manitoba and Ontario (1.10 and .66 cents per litre, respectively)

[i]Weighted mean of the three northern local service carriers -- Allegheny, Frontier and North Central

Appendix M

DETAILED COMPARISON OF THE PERFORMANCES OF ANSETT AIRLINES OF AUSTRALIA AND TRANS-AUSTRALIA AIRLINES, 1974-80

This appendix presents the analysis underlying the conclusion regarding the Australian airlines in Chapter XII. Through the use of more recently published data, it both extends and modifies David G. Davies' comparisons between the airline operations of privately owned Ansett Transport Industries and government-owned Trans-Australia Airlines. Data are now available through calendar year 1980 in contrast to Davies' time period which ended with fiscal year 1973-74. More importantly, however, is the fact that the recently published data are available for each of Ansett's four airline subsidiaries rather than for only their combined operations. Thus, it is now possible to make direct comparisons between the similar interstate operations of Ansett Airlines of Australia (AAA) and Trans-Australia Airlines (TAA) rather than between the overall airline operations of Ansett Transport Industries and TAA.

Problems with Davies' Evidence

There are three problems with Davies' data that decrease their usefulness in providing evidence regarding the performance of privately owned versus government-owned airlines. The first problem, aggregation of the data for the four Ansett airlines, has already been mentioned and was recognized by Davies. In his words:

> One possible deficiency in the data is that the statistics for the private firm include the figures for the Ansett Transport Industries' small intrastate airlines as well as the big interstate carrier, Ansett ANA. We were not able to obtain sufficient separate data for Ansett ANA *per se*.
>
> Should these subsidiaries have higher measures of productivity than Ansett ANA's measures of productivity, then our statistics presented below will overstate Ansett ANA's measure and make it appear to be more productive than it is. On the other hand, if the various ratios for the subsidiaries were below those of Ansett ANA, the latter's measures would understate its productivity.
>
> Unfortunately this is an empirical question and deduction is of little help in settling the issue. Sketchy empirical information, however, would tend to support the assertion that Ansett ANA's productivity for freight-mail and passengers is higher than that of the small intrastate subsidiaries. All but one of Ansett Transport Industries' intrastate subsidiaries operate on uneconomic routes and receive subsidies from the Commonwealth. In the absence of conclusive evidence to the contrary, however, we shall assume that the productivity of the subsidiaries is approximately the same as that of Ansett ANA. [Davies (a), pp. 161-162]

Since the detailed data for the four Ansett airlines have become available, it is now possible to determine the degree to which the measures of productivity differ among the Ansett subsidiaries, and this will be done in the following section, thereby eliminating this first problem.

The second problem with Davies' evidence is that the output measures he used were number of passengers, tons of mail and freight, and revenues (ibid., p. 161). It happens that an airline transporting its passengers and freight/mail an average of 500 miles is more productive in a physical sense than one that carries the same quantities of traffic only 250 miles. Unfortunately, this fact would not be reflected in Davies' first two output measures and would be somewhat obscured in the revenue measure if there were a significant distance taper in prices (see Figure 1).[1] Clearly, a better measure of passenger output would be revenue passenger-miles (RPM), while freight and mail output would be better represented by revenue ton-miles (RTM), both of which incorporate the important distance dimension of airline output.

The third problem with Davies' evidence is that it also ignores the differing relationships between distance and productivity measures for various inputs. Davies used employees as his input measure and compared the airlines' productivity in terms of number of passengers per employee, tons of freight and mail per employee, and revenue earned per employee. It happens, however, that there is a negative relationship between distance and employee productivity measured in terms of passengers or tons of freight/mail per employee due to the fact that it requires less labour to carry 1,000 passengers (or 10 tons of freight/mail) an average of 250 miles than to carry them an average of 500 miles. In contrast, productivity measured in terms of RPM or RTM per employee yields a positive relationship between average trip length (distance) and employee productivity (see Figure 8). Finally, given a balancing fare taper, revenue per employee may vary very little with changes in distance (see Figure 9).

Failure to recognize these differing relationships between distance and alternative measures of employee productivity is probably behind Davies' assertion in the third paragraph of the above quotation that Ansett ANA's employee productivity should be higher than that of Ansett's intrastate subsidiaries. This would be true in terms of RTM and RPM per employee if Ansett ANA had longer average trip lengths, but not in terms of passengers or tons of freight/ mail per employee. Unfortunately, Davies used the latter measures of employee productivity without recognizing that short-haul intrastate carriers are likely to outperform long-haul interstate carriers in terms of passengers and tons of freight/mail per employee.

Differences Between the Interstate and Intrastate Carriers

The more detailed data now available for 1974-80 show that appreciable differences have existed between Ansett's smaller intrastate carriers and the two large interstate carriers, AAA and TAA. First of all, during these years their fleets were largely comprised of different types of aircraft. AAA and TAA operated mainly Boeing B-727-100/200s and DC-9-30s, plus some Fokker F-27s, Lockheed L-188s and (for TAA) a few de Havilland DHC-6s. The three Ansett regional carriers, in contrast, operated primarily Fokker F-27s and F-28s, plus one or two DHC-6s and (in 1974) a Hawker HS-114 [ICAO (a)].

Second, as shown in Table M.1, there were also significant differences in average system scheduled trip lengths. Ansett Airlines of New South Wales (ANSW) had average passenger and freight/mail trip lengths about one-half those of AAA, while the trip lengths for Ansett Airlines of South Australia (ASA) were less than one-third as long as AAA. At the same time, the average trip lengths of MacRobertson Miller Airlines (MMA) over sparsely settled Western Australia were in excess of 25 per cent longer than those of AAA. More importantly, it can be seen that the average passenger trip lengths for all four of the Ansett subsidiaries (the grouping used by Davies) were consistently shorter than those of TAA, while AAA alone had longer trip lengths than TAA. Given the inverse relationship between distance and passengers per employee this reversal of the relative distances could have had a significant impact on Davies' findings. The same reversal did not apply to freight/mail trip lengths. The small freight operations of the regional carriers resulted in there being little difference between the average trip lengths of AAA and the total Ansett subsidiaries, with both AAA and Ansett Total having somewhat longer trip lengths than TAA.

Third, it happens that the three Ansett regional carriers did not report any maintenance and overhaul personnel in their employee counts. There are three possible explanations for the exclusion of these essential personnel: (1) AAA does all the maintenance/overhaul work for these carriers; (2) the maintenance personnel of the Ansett regional carriers are combined with, and reported by, AAA; (3) outside firms provide all maintenance/overhaul services for these firms. It seems likely that the first of the explanations is the correct one, but if either the first or the second possibility is true the proper adjustment would be to increase the regional carriers' maintenance/overhaul and total employment figures by appropriate amounts and reduce AAA's figures by equal amounts. This is done in Exhibit 1 (see p. 286).

The reported data given in Exhibit 1 for Ansett Total, Connair, East-West Airlines and TAA indicate that maintenance and overhaul employees comprise at least 20 per cent of total personnel for Australian airlines. Therefore, the Ansett regional carriers' total reported employees have been increased by 25 per cent, with the added employees being assigned to the maintenance/overhaul employee category. This adjustment makes each of these carriers' maintenance/overhaul employees 20 per cent of its <u>adjusted</u> employee total. AAA's reported maintenance/overhaul and total employee numbers have been reduced by equal amounts and these counterbalancing adjusted figures are given in Table M.2 for the four Ansett subsidiaries for each year from 1974 to 1980. These adjusted Ansett figures, plus TAA's reported figures, will be utilized in all employee productivity measures calculated in this appendix, thereby increasing AAA's employee productivity by about 2.8 per cent while decreasing those of the three Ansett regional carriers by 20 per cent. Obviously, the resulting figures are partial estimates, but there is good reason to believe they are considerably more accurate than productivity measures based on the reported employment data of the Ansett subsidiaries.

Table M.1

System Scheduled Passenger and Freight/Mail Trip Lengths
Ansett Airline Subsidiaries and Trans-Australia Airlines
1974-80

Cal. Year	Passenger Trip Length[a]						Freight/Mail Trip Length[b]					
	Ansett Subsidiaries					TAA	Ansett Subsidiaries					TAA
	AAA	ANSW	ASA	MMA	Total	Total	AAA	ANSW	ASA	MMA	Total	Total
1974	539	279	148	667	511	525	592	308	166	758	594	579
1975	548	273	152	693	519	536	613	298	169	777	614	604
1976	517	269	148	669	490	506	576	289	163	722	577	553
1977	514	272	152	669	489	510	559	296	161	690	559	544
1978	531	269	152	659	503	518	577	292	161	705	579	532
1979	540	269	150	681	512	528	551	288	151	736	556	522
1980	548	282	151	695	524	542	556[c]	290[c]	153[c]	747[c]	563[c]	520[c]
Mean[d]	534	273	151	676	507	524	575	295	161	733	577	547

Sources: Calculated from data in: Australian Department of Transport, 1974-75 to 1979-80; ICAO (b), 1976-80

[a]Statute miles. Total revenue passenger-kilometres divided by revenue passengers embarked, and multiplied by .62137

[b]Statute miles. Total freight plus mail tonne-kilometres performed divided by tonnes embarked, and multiplied by .62137

[c]Calculated from actual freight tons, freight RTM and mail RTM, plus estimated mail tons (see note d, Table M.3)

[d]Weighted average

Table M.2

Average Annual Number of Employees
Ansett Airline Subsidiaries and Trans-Australia Airlines
1974-80

Cal. Year	Average Number of Employees[a] Ansett Subsidiaries[b] AAA	ANSW	ASA	MMA	Total	TAA Total
1974	7,905.5	347.5	158.0	635.0	9,046.0	7,855.0
1975	8,149.0	369.5	172.5	640.0	9,331.0	7,904.0
1976	7,970.0	349.5	172.5	620.5	9,112.5	7,868.5
1977	8,036.5	334.5	176.0	631.0	9,178.0	8,001.5
1978	8,281.5	340.0	177.0	642.0	9,440.5	8,180.5
1979	8,340.0	337.0	166.0	657.0	9,500.0	8,226.5
1980	8,200.5	360.0	152.5	682.5	9,395.5	8,556.5

Sources: Calculated from data in: ICAO (a); Exhibit 1

[a]Simple average of mid-year and year-end employment for 1974-80

[b]The data for the individual Ansett subsidiaries are adjusted as described in the text. The Ansett and TAA totals are as reported.

Passengers and Freight/Mail Tons per Employee

The effect of Davies including Ansett's three intrastate carriers in his passengers per employee and freight/mail tons per employee measures is more clearly seen in Table M.3. To provide perspective, Davies' employee productivity measures for fiscal years 1971-74 are given for Ansett Total and TAA, and then the more detailed information for each of the four Ansett subsidiaries, Ansett Total and TAA are given for calendar years 1974-80.

Looking first at scheduled passengers per employee, it can be seen that during 1974-80 ANSW and ASA were well over twice as high as AAA in this measure, while MMA was generally slightly lower than AAA (all of which is consistent with the differences among these carriers' average passenger trip lengths). On average, the net effect of combining the three regional carriers with AAA is to yield passenger per employee measures for Ansett Total that are over six per cent higher than those of AAA for the seven years from 1974 through 1980. More significantly, it can be seen that TAA's passengers per employee figures consistently fall between those of AAA and Ansett Total; that is, they are about 4.5 per cent higher than AAA and about 1.5 per cent lower than Ansett Total. Davies reported that "(t)he average number of passengers carried per employee over the 16 years under observation is consistently higher for Ansett Airlines, the private company" [Davies (b), p. 225]. This is quite true for the combined four Ansett subsidiaries due to the very high figures for ANSW and ASA; but it is not true for AAA

Table M.3

System Scheduled Passengers and Freight/Mail Tons per Employee[a]
Ansett Airline Subsidiaries and Trans-Australia Airlines
FY 1971-74 and CY 1974-80

Year	Scheduled Passengers per Employee[a]						Scheduled Freight/Mail Tons per Employee[a]					
	Ansett Subsidiaries					TAA	Ansett Subsidiaries					TAA
	AAA	ANSW	ASA	MMA	Total	Total	AAA	ANSW	ASA	MMA	Total	Total
FY 71	n.a.	n.a.	n.a.	n.a	417[b]	399[b]	n.a.	n.a.	n.a.	n.a.	8.75[b]	5.70[b]
FY 72	n.a.	n.a.	n.a.	n.a.	437[b]	414[b]	n.a.	n.a.	n.a.	n.a.	8.82[b]	5.63[b]
FY 73	n.a.	n.a.	n.a.	n.a.	468[b]	449[b]	n.a.	n.a.	n.a.	n.a.	9.07[b]	5.62[b]
FY 74	n.a.	n.a.	n.a.	n.a.	532[b]	496[b]	n.a.	n.a.	n.a.	n.a.	10.02[b]	6.06[b]
Mean[c]	n.a.	n.a.	n.a.	n.a.	464[b]	440[b]	n.a.	n.a.	n.a.	n.a.	9.16[b]	5.75[b]
CY 74	485	1,054	1,238	500	521	515	9.17	6.91	4.80	10.54	9.10	6.65
CY 75	496	1,040	1,218	487	530	530	8.00	5.43	4.26	9.59	7.94	6.41
CY 76	487	1,067	1,233	470	522	512	8.21	5.59	4.16	10.04	8.16	6.55
CY 77	503	1,120	1,246	481	539	536	8.11	5.38	3.95	9.85	8.05	7.34
CY 78	533	1,232	1,291	535	573	552	8.45	5.55	3.65	11.12	8.44	8.14
CY 79	558	1,295	1,348	530	596	595	8.64	6.46	4.09	10.49	8.61	9.20
CY 80	607	1,218	1,399	554	620	600	8.53[d]	5.51[d]	3.95[d]	10.05[d]	8.45[d]	8.62[d]
Mean[c]	524	1,147	1,282	508	557	549	8.44	5.83	4.12	10.24	8.39	7.56

Sources: Calculated from data in: Australian Department of Transport, 1974-75 to 1979-80; ICAO (b); Table M.2; Davies (b), p. 226

[a]The Australian Department of Transport implies that its data are for scheduled operations, but they may include non-scheduled operations as well. ICAO data indicate that nonscheduled service has been operated only by AAA and TAA, and comprises less than 0.2 per cent of total traffic. Freight/Mail short tons equal metric tonnes times 1.10232.

[b]Davies does not state whether his data are for scheduled or for scheduled and nonscheduled service.

[c]Simple average of the values for FY 1971-74 or CY 1974-80

[d]Actual freight tons plus estimated mail tons based on percentage increases in mail RTM over 1979

alone, and AAA is the carrier whose operations are most similar to those of TAA.

The pattern is somewhat different for freight/mail tons per employee. In this case ANSW and ASA had lower tons per employee than AAA, while MMA had higher tons per employee resulting in the figures for Ansett Total being almost identical to those of AAA. Comparing the CY 1974-80 figures with Davies' figures for FY 1971-74, however, shows that there was something of a decline in this measure for Ansett Total (and probably AAA) over the 1970 decade. In contrast, the data for TAA show steady improvement between FY 1971 and CY 1980 in its freight/mail tons per employee figures. As a result, in 1979 TAA's freight/mail tons per employee exceeded those of AAA and Ansett Total. This situation continued through 1980.

Overall, using Davies' own productivity measures, direct comparisons between TAA and AAA (rather than Ansett Total) indicate similar employee productivity despite differences in ownership. This, of course, is consistent with the North American experience and is quite inconsistent with Davies' findings.

RPM and RTM per Employee

The detailed data for 1974-80 also allow comparisons to be made between the Ansett subsidiaries and TAA using the RPM and RTM measures which incorporate the important distance dimension of airline output.[2] Table M.4 presents scheduled RPM per employee, freight/mail RTM per employee and total RTM per employee. It shows that during these years TAA had higher RPM per employee than AAA except for 1980, and that TAA exceeded Ansett Total in this productivity measure for every year except 1978 and 1980. The opposite relationship applied to freight/mail RTM per employee -- both AAA and Ansett Total had higher RTM per employee than TAA for every year except 1979, when they were essentially equal in this measure.

Combining these two major segments of traffic into total RTM per employee again indicates that there has been no consistent pattern of superiority between the two interstate carriers.[3] AAA alternated between being slightly higher and slightly lower than TAA from 1974 to 1980, with these two carriers' simple averages for the full seven-year period being essentially equal. At the same time, Ansett Total was higher than TAA for five out of the seven years, but only by small amounts. Ansett Total's simple average for all seven years is just 1.2 per cent higher than that of TAA, and even this small performance superiority is due in large part to the high employee productivity of MMA in Western Australia. In general, then, the findings remain consistent with those for the North American carriers -- there appears to be no important differences in employee productivity attributable to differences in ownership.[4]

Table M.4

System Scheduled RPM, Freight/Mail RTM and Total RTM per Employee
Ansett Airline Subsidiaries and Trans-Australia Airlines, CY 1974-80

Cal. Year	Scheduled RPM per Employee[a]						Scheduled Freight/Mail RTM per Employee[b]					
	Ansett Subsidiaries					TAA	Ansett Subsidiaries					TAA
	AAA	ANSW	ASA	MMA	Total	Total	AAA	ANSW	ASA	MMA	Total	Total
1974	261,421	293,626	183,747	333,450	266,357	270,477	5,433	2,129	797	7,986	5,404	3,853
1975	271,572	284,422	185,264	337,305	274,994	284,491	4,905	1,618	719	7,450	4,872	3,870
1976	251,646	286,518	182,800	314,110	255,934	259,101	4,733	1,614	678	7,247	4,708	3,620
1977	258,902	305,160	188,954	321,597	263,557	273,810	4,528	1,590	636	6,789	4,502	3,991
1978	283,141	331,035	196,085	352,656	287,961	285,367	4,881	1,618	588	7,840	4,885	4,331
1979	300,820	348,516	202,614	360,843	304,947	313,937	4,757	1,860	619	7,725	4,787	4,800
1980	332,905	343,272	211,226	384,731	335,092	325,125	4,743	1,600	603	7,508	4,756	4,481
Mean[c]	280,058	313,221	192,956	343,527	284,120	287,473	4,854	1,718	663	7,506	4,845	4,135

Cal. Year	Scheduled Total RTM per Employee[d]					
	Ansett Subsidiaries					TAA
	AAA	ANSW	ASA	MMA	Total	Total
1974	31,368	31,260	19,025	41,066	31,829	30,687
1975	31,848	29,835	19,101	40,916	32,154	32,094
1976	29,699	30,040	18,812	38,411	30,099	29,325
1977	30,214	31,865	19,381	38,694	30,649	31,156
1978	32,972	34,459	20,040	42,827	33,453	32,642
1979	34,601	36,436	20,719	43,525	35,041	35,946
1980	37,770	35,656	21,561	45,676	38,000	36,737
Mean[c]	32,639	32,793	19,806	41,588	33,032	32,655

[a]RPM equals revenue passenger-kilometres times .62137.

[b]RTM equals metric tonne-kilometres times .68495.

[c]Simple average of the values for 1974-80

[d]Passenger, freight and mail RTM

Sources: Calculated from data in: Australian Department of Transport, 1974-75 to 1979-80; ICAO (b); and Table M.2

Exhibit 1

Average Annual Number of Employees by Category
Australian Domestic Airlines as Reported and
as Adjusted to Allocate AAA Maintenance Employees
Among All Ansett Subsidiaries, 1974-80

Carrier	Average Annual Number of Employees[a]						
	Pilots & Copilots	Other Cockpit	Cabin Attend.	Maint. & Overhaul	Traffic & Sales	All Other	Total
				A. As Reported			
AAA	546.3	115.6	783.3	1,898.1	2,232.2	2,782.6	8,358.1
ANSW	67.9	0	61.0	n.r.[b]	33.9[c]	115.8[c]	278.6
ASA	29.2	0	32.4	n.r.[b]	58.9	13.7	134.2
MMA	79.4	0	71.2	n.r.[b]	222.3	142.3	515.2
Total	722.8	115.6	947.9	1,898.1	2,547.3	3,054.4	9,286.1
Connair[d]	30.2	0	12.8	65.9	24.2	21.3	154.4
East-West[e]	90.9	0	72.0	133.5	111.2	78.1	485.7
TAA	577.8	92.1	745.3	1,818.7	2,312.9	2.538.0	8,084.8
				B. As Adjusted			
AAA	546.3	115.6	783.3	1,666.1[f]	2,232.2	2,782.6	8,126.1[f]
ANSW	67.9	0	61.0	69.7[g]	33.9	115.8	348.3[g]
ASA	29.2	0	32.4	33.5[g]	58.9	13.7	167.7[g]
MMA	79.4	0	71.2	128.8[g]	222.3	142.3	644.0[g]
Total	722.8	115.6	947.9	1,898.1	2,547.3	3,054.4	9,286.1

Sources: Calculated from data in ICAO (a)

[a]Simple average of mid-year and year-end employment from 1974-80

[b]None reported. It appears that all maintenance for this carrier is done by AAA or that its maintenance employees are reported with those of AAA.

[c]Data for traffic and sales employees and all other employees appear to be reversed for 1974-75 and 1980. This average was calculated after reversing the data for these two categories to be consistent with the values for 1976-79.

[d]Average for 1974-79. Data for 1980 are not available as this is being written.

[e]Average for 1975-80. Data for 1974 are not available.

[f]Reported figure minus estimated maintenance and overhaul employees allocated to Ansett's three regional carriers

[g]Estimated by assuming maintenance and overhaul employees equaled 25 per cent of reported total employment (or 20 per cent of adjusted total employment)

Conclusion

It turns out that the North American and Australian evidence regarding the relative performance of privately owned and government-owned airlines is consistent afterall. Simply removing the Ansett intrastate carriers' data for passengers from that of Ansett Total generally reverses the relative performances of the privately owned and government-owned interstate airlines, with the same being true for freight/mail tons per employee starting in 1979. These new intercarrier relationships are carried over into the RPM and the freight/mail RTM per employee measures which include the distance dimension of transportation output. The passenger and freight/mail performance differences are small and largely offsetting, and combining passenger and freight/mail RTM into total RTM yields employee productivity measures for AAA and TAA that are virtually identical. The inherent limitations of the data and the possible inaccuracies in the distribution of total Ansett employees among its four subsidiaries would require appreciable differences before one could conclude that the performance of either of the Australian interstate carriers is superior to the other. Therefore, the most appropriate conclusion is that employee productivity is essentially the same so that there is no evidence that ownership has had an appreciable effect on the operations of these regulated airlines. This, of course, is the same conclusion derived from the North American evidence.

Footnotes

1. A fare taper appears to exist in Australia since the fares of AAA and TAA are based on "flagfall" and mileage charges (Australian Department of Transport, 1977-78, p. 175).

2. Neither the Australian Department of Transport nor ICAO publishes revenue and expense data for domestic airlines. Therefore, it has not been possible to extend Davies' revenue per employee data for the Ansett subsidiaries.

3. ICAO calculates passenger RTM from RPM by assuming each passenger and his baggage weigh an average of 90 kilograms (198.4 pounds).

4. The RPM and RTM per employee data have one anomaly that deserves mentioning. Given the effects of distance on employee productivity (see Figure 8), Table M.1 implies that these measures for short-haul ANSW and ASA should be lower than those for AAA and TAA, while long-haul MMA should be somewhat higher in these measures. This is the case in Table M.4 except for ANSW in terms of RPM per employee and total RTM per employee. This carrier had higher RPM and total RTM per employee relative to AAA and TAA despite its shorter average trip lengths. This could be due to the possibility that AAA provides services such as ground handling and reservations to the small intrastate subsidiaries in addition to the maintenance and overhaul services mentioned above. If so, then AAA's total employment should be reduced somewhat more than was done in Table M.2. This would further serve to yield small increases in AAA's employee output while causing larger decreases for

ANSW (and probably ASA and MMA as well). Of course, any reallocation of personnel among the Ansett subsidiaries would have no impact on the measures for Ansett Total. It would be desirable to determine the extent that such adjustments should be made, but the similarities among AAA, Ansett Total and TAA for total RTM per employee make it unlikely that the conclusions of this analysis would be changed by any additional reallocations of personnel.

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